A

TREATISE

UPON

GRAVEL

AND UPON

GOUT,

IN WHICH

THE SOURCES OF EACH ARE INVESTIGATED,

AND

EFFECTUAL MEANS OF PREVENTING,

OR

OF REMOVING THESE DISEASES,

RECOMMENDED.

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PREFACE.

THE Author of the following Treatiſe is aware that it will appear eſſentially different from his late publication on the ſame ſubjects. A more accurate inveſtigation of the affections, concerning which he had ventured to deliver his ſentiments, made him acquainted with an error in his former opinion, and he held

it incumbent upon him to ſend forth an immediate correction of it.

The miſtake to which he alludes, is in regard to the matter of urinary concretions. This matter was almoſt univerſally ſuppoſed to be calcareous earth. It has been conſidered as ſuch, by chemiſts even of eminence, who pretended to have examined it. The Author, never doubting the truth of their obſervations, attempted to account for the production of calculi, on principles that were ſuited to the idea of their being calcareous. He is ready to take blame to himſelf

ſelf for having placed too much reliance upon authorities to which leſs confidence was due, and he has endeavoured to make atonement, by the introduction of experiments upon which his concluſions muſt reſt.

The Author continues to withhold his name from the world, not from the apprehenſions of any difficulty in the defence of his opinions, but becauſe he is deſirous that they ſhould be conſidered without any regard to the perſon from whom they have ariſen. He has only to requeſt, that the whole may be weighed with caution,

caution, and reflected upon with impartiality, before judgment be pronounced.

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A TREA-

A

TREATISE

UPON

GRAVEL, &c.

THE INTRODUCTION.

THERE are few diſeaſes from which greater ſufferings are endured, than from urinary concretions; yet, notwithſtanding their frequency, very little has been known concerning the circumſtances which produce them, or the means by which they may be prevented. As a

proof of this aſſertion, witneſs the very painful and dangerous operations that are daily put in practice for the extraction of ſtones.

THE affection which paſſes by the name of GOUT, has very much engaged the attention of medical men. It is, on account of the violence of its ſymptoms, and the numbers that labour under it, a malady of the moſt ſerious importance. Phyſicians have exerted themſelves to find out a remedy for it, but their endeavours have not hitherto been crowned with ſucceſs. Amidſt modern diſcoveries, the improvements in Medicine are not the leaſt conſiderable; yet it is remarkable, that no material advantage has been gained in the inveſtigation of this Diſeaſe. Experience has

has taught in what manner its violence may be mitigated, but no effectual means of cure have as yet been ſuggeſted. The moſt eminent of the profeſſion have acknowledged themſelves unacquainted with the cauſe of Gout, and for this reaſon it has emphatically been termed the OPROBRIUM MEDICORUM.

AN examination of the various theories that have been formed reſpecting theſe diſeaſes, would be tedious and unentertaining. Many of them were plauſible, while others have not had even ingenuity to recommend them. They are complaints with which the rich and the luxurious are very frequently afflicted, and the eagerneſs of ſuch to be relieved, has expoſed them to become the dupes of

unprincipled individuals, who levy immenſe contributions by the ſale of their unavailing noſtrums. While it is admitted that every other ſcience is to be learnt by ſtudy and application alone, an opinion appears to prevail, that the medical art may be obtained upon eaſier terms, and the higheſt confidence is placed in the arrogant profeſſions of deſigning and illiterate Quacks. It is amazing that any man of underſtanding ſhould venture to commit the management of his deareſt concerns, to the blind guidance of ſuch pretenders. Too often the conſtitution has been ſacrificed to the blunders of empirics, and their unhappy employers have lamented their credulity, when the melancholy conſequences were irretrievable.

WITHOUT entering into any minute inveſtigation of the opinions of others, we ſhall endeavour to ſtate our own ſentiments concerning the diſeaſes in queſtion. After enquiring into the cauſe and progreſs of each, we ſhall proceed to conſider of the means by which they may be prevented and removed.

PART I.

ON THE

CAUSE AND PROGRESS

OF

GRAVEL.

SECT. I.

On the Matter of Urinary Concretions.

THE concretions generated in the urinary paſſages are of various ſizes and figures. They differ, likewiſe, from each other, in reſpect to colour, texture, and ſpecific gravity. A conſiderable de-

gree of variety is frequently obſervable in the ſame concretion, for when cut into they are found of a laminated ſtructure, and the ſeveral lamina are ſometimes very different in appearance. An infinite number of opinions have been held reſpecting the matter of them, but it does not appear that many experiments have been made, by which any accurate knowledge of its properties could be obtained. The qualities aſcribed to it had their foundation in conjecture merely. It was conſidered as acid by ſome, and as alkaline by others. Not unfrequently it was compared to the Tartar which is ſeparated from wines during fermentation, and in treating of it, many authors were uſed to talk of earth, ſalts, air, oil, and ſulphur, without appearing to have any preciſe

ideas

ideas in regard to the meaning of theſe terms.

URINARY concretions, from having a conſiderable reſemblance to chalk-ſtones, were frequently conſidered as calcareous earth. This opinion was ſo prevalent, that it has ſeldom been called in queſtion. It originated from outward appearance, but it was ſuppoſed to have received confirmation from experiment, for it was maintained even in the medical theatres.

AT length, an inveſtigation of the properties of this matter was entered upon by Mr. Scheele and Sir T. Bergmann, theſe diſtinguiſhed chemiſts, to whom the world is indebted for many important and valuable diſcoveries, with which ſcience has

has been enriched. From the result of their experiments it appears, that urinary concretions, however different in colour and texture, are essentially the same, and that they are formed of a peculiar substance, which, on account of some of its properties, they consider as an acid. If they contain any calcareous earth, it is in so small a proportion, that it was entirely overlooked by Mr. Scheele. Bergmann imagined that he discovered a very little of it, not amounting to a hundredth part of the whole mass. It is probable, however, that he was mistaken in this opinion, as the experiment upon which it is grounded, is by no means of a satisfactory nature. At any rate the quantity is too minute to require being taken notice of.

Mr.

Mr. Scheele has informed us, that the powdered calculus was diſſolved by concentrated vitriolic acid with the aſſiſtance of heat; but that the muriatic acid had not the ſmalleſt effect upon it, even when boiled with it. Theſe experiments alone afford ſufficient proof that it is not made up of calcareous earth. It is a property of that earth to combine with vitriolic acid into an almoſt inſoluble concrete, whereas it unites very readily with muriatic acid, into a compound ſo eaſy of ſolution, as to attract water from the atmoſphere.

The calculus was attacked by concentrated nitrous acid with great violence, and with the aſſiſtance of heat it was readily diſſolved by the ſame acid when diluted.

diluted. The acid of ſugar, which attracts calcareous earth from every other acid, and unites with it into a ſubſtance inſoluble in water, did not produce any precipitation when mixed with this ſolution; neither was it materially affected by alkalis. The compound of the matter of calculi with the diluted nitrous acid, was of a yellow colour. When the ſaturation was complete, it diſcovered very little of the ſmell or taſte of the acid, and it had a ſingular property of communicating red ſpots to the ſkin. On evaporating it to dryneſs, there remained a roſe-coloured ſpongy maſs, eaſily ſoluble in water, to a large quantity of which it gave a deep red colour.

THE powdered calculus was not in any manner affected by a ſolution of mild alcalis, either fixed or volatile, but it was entirely diſſolved by ſuch as were perfectly cauſtic. Theſe ſolutions, likewiſe, were of a yellow colour, and the calculus was precipitated by every acid, and by fixed air.

THE matter of urinary concretions was diſſolved by digeſtion in lime-water. Four ounces of the latter were required for twelve grains of the former, and the ſolution, like the alkaline ones, was decompoſed by acids.

THE calculus was ſoluble in boiling water, in the proportion of about eight grains to five ounces, and the greateſt part of it was depoſited in fine chryſtals,

as

as the fluid became cold. The ſolution gave a red colour to paper ſtained with lacmus.

It appeared adviſeable to relate thus much of the experiments of Mr. Scheele, as ſome of my readers may not have had an opportunity of peruſing his ingenious eſſay. From the whole he concludes, that the matter of urinary concretions is not, as had generally been ſuppoſed, calcareous, but a peculiar acid ſalt, with which is blended a portion of animal gelatinous matter. Its ſolubility in boiling-water, and the chryſtaline form which it afterwards aſſumed, induced him to conſider it as a ſaline ſubſtance. The alteration of colour produced by the ſolution on lacmus, was the mark of its acidity.

The

The obſervations of Bergmann were nearly to the ſame purpoſe.

NOTWITHSTANDING the deference that was due to the opinions of theſe gentlemen, many doubts have been entertained reſpecting the propriety of claſſing this matter among the acids. It does not betray any acidity to the taſte. The colour of the ſyrup of violets is not affected by the ſolution of it in boiling-water. In its combination with alkalis and lime, there is ſomething that makes againſt the opinion of its being an acid; for, unlike to every other acid, it is precipitated from them by fixed air. In this reſpect, the compounds are analogous to ſoaps formed by the union of alkalis with oily and mucilaginous ſubſtances.

On the other hand, the circumſtance of its communicating a red colour to paper ſtained with lacmus, was a ſtrong preſumptive proof of its acidity. The lacmus is a nicer teſt than the juice of violets, and diſcovers more readily the ſmalleſt quantity of acid. The inſipidity of this matter might be owing to water not being capable of taking up a quantity ſufficient for producing any effect upon the tongue, as nothing can be taſted unleſs applied in a fluid form. The decompoſition of its compounds with alkalis and with lime by fixed air, was a point from which no poſitive deduction could be drawn. That air has been proved to be itſelf an acid, and by many very eminent chemiſts, it is termed the aerial acid. It was not, therefore, improbable, that the

matter

matter of calculi might be an acid, of which the attraction to alkalis and to earths is leſs powerful than that of the ærial acid to the ſame ſubſtances.

Since it came to be known that the calculus is not calcareous, many have been of opinion that it is of a mucilaginous or gelatinous nature. With a view of clearing up the uncertainty in regard to it, I examined with attention its compound with cauſtic fixed vegetable alkali, and my concluſions were in favour of its being an acid. Theſe ſubſtances, when united, did not in taſte or in appearance diſcover the leaſt reſemblance to the ſaponaceous compounds produced by the union of alkalis with the gelatinous parts of animals.

I determined next upon endeavouring to combine this matter with magnesia. It appeared probable, that if it was an acid it would admit, like other acids, of being united with the earth of that name. Having obtained a concretion of a reddish colour, of firm texture, and of great specific gravity, a few grains of it, with an equal quantity of calcined magnesia, after being rubbed together in a glass mortar, were put into a vial with three or four drachms of distilled water; they were made to boil for a few minutes by being suspended over the fire: the whole was then poured upon a filtering paper, and the fluid which immediately passed through was of a yellow colour, like the solution of calculus in caustic alkali. I was satisfied from the appearance of it that

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a combination had taken place. It became turbid as it cooled, and there was depoſited an aſh-coloured powder, which upon examination proved to be neither magneſia nor calculus, but a compound of the two. This powder was immediately rediſſolved on making a ſecond application of heat, and the whole became tranſparent again. To one part of the ſolution in this ſtate, a drop or two of muriatic acid was added, and the matter of the calculus was precipitated; a ſmall quantity of cauſtic alkali was mixed with another part of it, and a depoſition of magneſia took place. In the firſt inſtance, the muriatic acid united with the magneſia ſo as to ſeparate the calculus; in the ſecond, the cauſtic alkali attached itſelf

to the matter of the calculus, and cauſed the magneſia to be precipitated.

THIS laſt experiment afforded the moſt perfect ſatisfaction, in regard to the point which it was intended to elucidate: it eſtabliſhed, in the fulleſt manner, the acidity of the matter of urinary concretions. Cauſtic alkalis and lime are capable of being combined with the oily, the reſinous, and the gelatinous parts of animals; but magneſia, when thoroughly calcined, is not acted upon by boiling-water, and acids are the only ſubſtances with which it can be united into ſoluble compounds.

THE compound of the calculus with magneſia is diſſolved by water in a much larger

larger proportion than the calculus alone. If a little muriatic acid be mixed with a ſaturated ſolution while hot, the matter of the calculus ſeparated in the form of a white powder, will be in ſufficient quantity to give to the whole the conſiſtence of cream. After ſtanding for ſome time, the particles of this powder, by getting together, become larger, and ſubſide to the bottom. If an acid be added to a very diluted ſolution of the compound, and the whole permitted to remain at reſt for a few hours, the precipitate appears in fine chryſtals adhering to the ſides of the vial.

I obtained a further confirmation of the acidity of the calculus, by combining it with the pure earth of alum. I have

not made any trial of its effects upon the calces of the metals; but it is probable that, like other acids, it might be united with ſeverals of them.

This acid is not a ſimple element, but appears to be a compound body. When expoſed to a certain degree of heat it is decompoſed, and it yields nearly the ſame products as animal matter, leaving a coal convertible by the force of fire into earth. Its compounds with alkalis and with magneſia, when evaporated to dryneſs, began to emit vapours of volatile alkali in a degree of heat not very conſiderable.

The moſt certain criterion for diſtinguiſhing the matter of calculi from every other ſpecies of matter, is the change of co-

colour to which its compound with nitrous acid is liable when applied to the ſkin, and when exſiccated. The yellow ſolution does not at firſt appear to produce any effect upon the ſurface of the body, but after an hour or two the part that was touched with it looks red, and at laſt it becomes of a blood red; the alteration takes place without any ſenſe of burning, and the colour admits of being eaſily waſhed off. This experiment ſucceeds beſt when the nitrous acid is ſaturated with the calculus; but for the appearance of the red maſs after exſiccation, no great nicety in this reſpect is requiſite, as the ſuperfluous acid is carried off by evaporation.

The acidity of this matter having been demonſtrated, it ought hereafter in che-

mical arrangements to have a place among the acids; and, as forming the basis of urinary concretions, it may be termed *the concreting acid*, or *the acid of calculi*.

SECT.

SECT. II.

On the State in which this Matter is contained in the Fluids.

MR. Scheele has obſerved, that the matter of calculi is always preſent in the body. When a quantity of freſh urine had been made to boil until much diminiſhed by evaporation, he found that there was depoſited as it became cold a white powder, which in part adhered to the ſides of the glaſs. This powder appeared to be ſimilar in its properties to the ſubſtance of urinary concretions, and he was of opinion that the lateritious ſediment

ment of the urine is the ſame ſpecies of matter.

I have diſcovered an eaſier proceſs by which the concreting acid may be demonſtrated. It may be precipitated from the urine at any time, by the addition of a different acid. If twenty or thirty drops of muriatic acid be mixed with half a pint of clear urine, no immediate decompoſition appears to take place, for in general the whole continues tranſparent; but, after remaining at reſt during twenty-four hours, a great number of beautiful chryſtals, of a reddiſh brown colour, will be diſcovered on the inſide and at the bottom of the vial. I have repeated this experiment with ſeveral other acids, and with the ſame effect. A depoſition

ſition invariably took place of a matter which moſt frequently appeared in the form of diſtinct and tranſparent chryſtals, but ſometimes in that of a fine powder, by which the urine was rendered turbid, in the ſame manner as by the common lateritious ſediment.

I have collected a conſiderable quantity of this matter, by filling every morning a bottle holding about a quart with recent urine, into which was agitated a drachm or two of muriatic acid. On the ſucceeding day, when the cryſtallization was compleated, I cauſed the fluid to be poured off, with care that none of the chryſtals were loſt. The bottle was then filled as before, and the proceſs was continued until the inner ſurface had acquired

ed a thick cruſt of the adhering matter. By violent agitation with a few ounces of cold water, a great number of the chryſtals were detached from the glaſs and fell to the bottom; the others were ſeparated by means of a feather, and the whole was poured upon a ſtrainer of fine linen, in which, after the water had paſſed through, there remained about two drachms of a matter in appearance like red ſand. This matter, when chemically examined, turned out to be of the nature of urinary concretions. Like the calculus, it was ſoluble with the aſſiſtance of heat in concentrated vitriolic acid. Like the calculus, it united with diluted nitrous acid into a yellow ſolution, which diſcovered the characteriſtic properties of communicating red ſpots to the

the ſkin, and of leaving, when evaporated to dryneſs, a roſe-coloured ſpongy ſubſtance. Like the calculus, it was capable of being combined with cauſtic alkalis both fixed and volatile, with lime, with magneſia, and with the pure earth of alum; from all of which it was precipitated by every other acid. Like the calculus, it was diſſolved by being boiled in diſtilled water, and in like manner it was depoſited on cooling. It would have been difficult for the moſt accurate chemiſt to diſtinguiſh, by the niceſt experiments, between the matter of theſe chryſtals and that of a real concretion from the kidnies or bladder. The chryſtals are the ſpecific matter of calculi, the pure concreting acid which forms the baſis of urinary concretions. For inveſtigating the properties

perties of that acid they are to be preferred to the calculus itſelf, becauſe it is probable, that to a ſtone in the body a little of any adventitious matter happening to be contained in the urine may frequently adhere.

CONSIDERING how much the urine has engroſſed the attention of medical men, and the numbers of experiments that have been made upon it, it is aſtoniſhing that the precipitation of this matter by acids ſhould never have been taken notice of. Perhaps the time * that is requiſite before the

* In the urine of ſome people, the proportion of concreting acid is ſo conſiderable as to cauſe an immediate loſs of tranſparency when any other acid has been added; and, in this caſe, the precipitate does not appear in the form of chryſtals, but moſt commonly in that of an aſh-coloured powder, producing a kind of ſediment frequently alluded to in the courſe of this treatiſe.

the chryſtals make their appearance, has occaſioned them to be overlooked. The diſcovery throws a new light upon a ſpecies of matter from which very important effects will be found to ariſe.

A chemical examination of the blood itſelf is attended with great difficulty, on account of the gelatinous matter that enters ſo largely into its compoſition; but the beſt inveſtigators have been of opinion, that it is impregnated with ſaline ſubſtances, of the ſame kind as theſe contained in the urine. The proportion, however, is not ſo conſiderable. The ſolution of ſalts in the circulation is diffuſed through the other conſtituent parts, the lymph, the ſerum, and the red particles. The urine is that ſolution ſeparated by filtration

tion in the kidnies. Upon mixing a few drachms of diſtilled vinegar with five or ſix ounces of ſerum, I have frequently obſerved, that after a day or two there were depoſited ſome ſolid particles, which appeared in part to be the concreting acid; but the veſcidity of the fluid is extremely unfavourable to the formation of chryſtals.

It is probable that the precipitation of the concreting acid, when any acid of a different kind has been added to the urine, takes place in conſequence of its being ſeparated from ſome other matter, with which till then it was combined. This matter may be volatile alkali, or lime, as there is in the fluids a quantity of each in conjunction with acids; or it may be

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the earthy ſubſtance formed by the union of phoſphoric acid with lime, and to which the name of animal earth has commonly been applied. I have ſucceeded in combining the concreting acid with animal earth obtained from the urine by precipitation with cauſtic volatile alkali. The proceſs was the ſame as that by which it was made to unite with magneſia, and the compound is more eaſy of ſolution in water than the pure acid.

For aſcertaining whether the matter with which the concreting acid appears to be combined is lime, animal earth, or volatile alkali, a train of accurate experiments would be requiſite, as a table of the general order of elective attractions is not always ſufficient for explaining the

action of bodies upon each other when in a compounded ſtate. From the effects of acids upon the urine, it may be preſumed that the greateſt part of it is naturally united with one or other of the three, but I think that there is beſides a ſmall quantity ſimply diſſolved in the fluids. When the urine is left to itſelf, we do not find any appearance of chryſtals as when an acid has been mixed with it, but there takes place a ſpontaneous ſeparation of a peculiar matter, forming what has been called the cloud. There is much difficulty in collecting this matter in ſufficient quantity for making any accurate experiments; but I ſuſpect that it ariſes from an inconſiderable redundancy of the concreting acid in conjunction with ſomething mucilaginous. When diſeaſes, during

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the continuance of which there was not any veſtige of the cloud, have ſubſided, the ſeparating matter of the urine is frequently in an unuſual proportion, and in ſuch caſes it appears to conſiſt principally of the concreting acid, of which the chryſtallization has been prevented by a gelatinous matter that is blended with it. It is probable that the compoſition is the ſame as that of the natural cloud, and that the increaſe in the quantity, is the conſequence of a previous accumulation.

When any of the common acids have been added to the urine for the purpoſe of producing a precipitation of the acid of calculi, the matter of the cloud appears ſometimes to have united with the chrytals: at other times they are entangled

in it and prevented from ſinking to the bottom. When, after the urine has become cold, the cloud is ſeparated by filtration before an acid be applied, the chryſtals are in general more perfect than if it had remained. If, when the cloud has ſubſided, the tranſparent urine be poured off, and an acid mixed with the other part, the precipitate, inſtead of forming itſelf into regular chryſtals, appears to join with the numerous particles of the cloud, and the whole is rendered turbid by a flaky ſubſtance, ſo very light that a large ſpace at the bottom of the glaſs will be occupied by a very inconſiderable quantity.

A redundancy of the concreting acid producing any other ſeparation in the urine

urine than the common cloud, is to be conſidered as preternatural. It is frequently met with, however, under particular ſtates of the ſyſtem, and it is ſometimes ſo great, that a depoſition of the particles takes place in the urinary paſſages, giving occaſion to gravel and calculi. We are now to enquire into the ſources of this unuſual redundancy.

SECT. III.

On a preternatural Redundancy of this Matter, and on the Concretion of it in the Urinary Paſſages.

AS in the ſubſequent part of this treatiſe we ſhall have frequent occaſion to ſpeak of a *preternatural redundancy* of the concreting acid, it is neceſſary to be explicit in regard to the meaning of that expreſſion. In the laſt ſection it appeared probable, that the greateſt part of this acid is united either with lime, with animal earth, or with volatile alkali, but that there is beſides, a little ſuper-abundance

dance producing the cloud. By a preternatural redundancy, we mean an increaſe of the ſuperabundant quantity. The term is to be underſtood as applying, not to the proportion that might be precipitated from a given quantity of urine, but to that already in a ſeparate ſtate, or in the form of an acid.

In the fluids of the body there are various ſalts, with the uſes of which we are unacquainted. It has not been aſcertained, whether they be applied to ſpecific purpoſes in the œconomy, or be a form under which the animal particles are carried off, when they ceaſe to be of ſervice in the ſyſtem. The greater proportion of them, however, in the urine, an excrementitious fluid than in the blood itſelf,

renders it probable that they are excrementitious. Unleſs we conſider them as ſuch, the ſeparation of them from the circulation by the emunctories, muſt appear an unneceſſary waſte. In the natural ſtate of an animal there is a balance kept up among the ſeveral emunctories. The ſecretion by particular glands is retarded or promoted by a variety of circumſtances, and a diminution of it in one is generally attended with an increaſe of it in another. Now it may happen, either from an affection of the veſſels of the kidnies predifpoſing to a greater ſecretion by them, or from a check being given to the ſecretion by the emunctories in other parts, that a preternatural quantity of the excrementitious matter of the blood ſhall be carried off with the urine. In ſuch caſes,

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inſtead of the uſual cloud from a ſmall ſuperfluity of acid, there would be that kind of ſediment by which a conſiderable redundancy is indicated.

ANOTHER cauſe of redundancy has already been alluded to. From an univerſal tendancy to contraction in the emunctories the acid may be retained in the veſſels ſo as to accumulate, and when at laſt they are relaxed, it will appear preternaturally redundant in the urine.

IN ſome caſes there may be an actual production in the ſyſtem of a greater quantity than uſual of the concreting acid. The proportions of the various conſtituent parts of our fluids are different under different circumſtances; they depend upon

upon the ſtate of the body at the time, and are liable to alter with it. In conſequence, therefore, of particular affections, there may be an increaſed production of this acid. An exceſs likewiſe in the quantity of the other acids which have been conſidered by chemiſts as entering into the compoſition of the animal ſalts, would cauſe a preternatural redundancy of the concreting acid. Its attraction to alkalis and to earths being the weakeſt, it would give place to the more powerful ones.

From theſe circumſtances occurring ſeparately or together, there will be in the urine a redundancy of concreting acid, ſhewing itſelf by a preternatural ſediment, and perhaps in certain caſes it may be in a ſuf-

a ſufficient degree for the production of calculi and gravel. Theſe, however, are ſeldom met with. The phenomena of urinary concretions will be accounted for with leſs difficulty in the greateſt number of inſtances upon a principle which is now to be conſidered, the introduction into the veſſels of a foreign acid.

If any other acid of which the attraction to alkalis and earths is ſtronger than that of the concreting acid, ſhould be received from the ſtomach or inteſtines into the circulation, it will be ſecreted by the kidnies, and mingling with the urine, it will produce the ſame effects upon it as when they are mixed together in a vial. To a ſeparation of the acid from this cauſe, and a conſequent depoſition of it

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in the kidnies and in the bladder, we ſhall find that gravel and calculi are in general to be aſcribed.

KNOWING the nature of the concreting matter, the precipitation of it from the abſorption of any other acid, muſt appear as obvious as any chemical propoſition. It will be admitted, that acids may be taken up by the lacteals, as well as many ſubſtances which are diſcovered in the urine ſoon after they have been received into the ſtomach; and if they be in like manner abſorbed, a ſeparation of the concreting acid is inevitable. If medical men had entered at a more early period upon a correct examination of the matter of urinary calculi, they could not have remained ſo long in ignorance of the

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ſources from which they originate. But although they were unacquainted with the nature of theſe concretions, obſervation had pointed out the miſchievous tendency of acids in the affections which proceed from them; and accordingly acid wines, and acid or aceſcent vegetables, have uſually been enumerated among the moſt active cauſes of gravel.

EMINENT phyſiologiſts have been unwilling to introduce chemiſtry into the proceſſes of the animal œconomy. We agree with them, that the natural operations of the ſyſtem are not to be accounted for on the principles of that ſcience; but the matter of the body is liable to be chemically acted upon by the application of matter from without. The ſalts in the fluids

fluids of animals are ſubject to the ſame attractions as in any other ſituation, and they are capable of being decompoſed by the introduction of foreign matter. When cauſtics are applied, we find that the actions even of life are obliged to yield to the irreſiſtible influence of chemical attraction. How much ſtronger muſt that influence be upon a matter appearing to be excrementitious, and therefore not veſted with the powers of life.

An acid conveyed into the bladder by the urethra, would cauſe a precipitation in the urine, and the concreting acid would be found preternaturally redundant. It is evident that the action of an acid brought to the urinary paſſages by the courſe of the circulation, muſt be in

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every reſpect ſimilar. The effect is ſo very obvious that there would be difficulty in ſuggeſting any circumſtances by which it could be prevented. In ſhort, all who are not prepared to deny the poſſibility of acids being abſorbed, and afterwards ſecreted by the kidnies, muſt give their aſſent to it.

A ſeparation of the concreting matter may be occaſioned by the abſorption of an acid that has been received into the ſtomach, or of an acid generated in the primæ viæ. We are in the habit of uſing acids on many occaſions; they are a principal ingredient in the liquors to which we are moſt partial, and the ſymptoms of gravel very often attend upon an unlimited indulgence in theſe liquors. The production

duction of acid in the alimentary canal, is a frequent conſequence of a weakneſs in the digeſtive powers. When the tone of the ſtomach is deficient, the vegetable part of the diet, inſtead of being converted into chyle, is permitted to run into the vinous and acetous fermentations. From theſe proceed flatulency, heartburn, and a variety of unpleaſant ſymptoms frequently attributed to an exceſs of bile. In conſequence of ſuch fermentation, there is generated an acid of the nature of vinegar and ærial acid. The vinegar will be abſorbed, and a precipitation of the concreting matter occaſioned by it. It may be doubted, whether or not the ærial acid in the form of vapour can be taken up by the lacteals; but by uniting with the aqueous fluids in the ſtomach

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and inteſtines, it may perhaps be conveyed into the circulation.

I ſuſpect that a portion of the animal earth in the fluids is naturally united with ærial acid. When tranſparent urine in a vial is ſuſpended over a fire, there appears, as the heat increaſes, a froth upon the ſurface, and before it has began to boil, or immediately after, the whole is rendered turbid by a white powder, ſoluble in acids, and agreeing in its other properties with animal earth. It is probable that this alteration muſt take place in conſequence of the acid with which the earth was combined having been expelled; and we conclude that it muſt have been the ærial acid, becauſe the degree of heat does not appear to have been ſufficient for the ex-

pulſion of the others that have been diſcovered in the urine. When water, in which magneſia is ſuſpended by means of this acid, is treated in the ſame manner, the effect is nearly ſimilar. The acid is carried off by evaporation, and the magneſia ſubſides.

If the proportion of ærial acid can be increaſed by its paſſing from the alimentary canal into the circulation, a preternatural redundancy of the concreting acid would be produced by it. When fluids fully ſaturated with it are received into the ſtomach, we can conceive that it may be carried along with them in ſufficient quantity to cauſe a conſiderable precipitation. In the liquors, however, in which it is employed, it is in general accompa-

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nied with other acids; and the generation of it in the primæ viæ is very often attended upon by that of acetous acid. For theſe reaſons there is ſome difficulty in determining, whether or not Gravel can be derived from the introduction into the veſſels of ærial acid by itſelf.

Gravel is one of theſe diſeaſes which have the appearance of being tranſmitted by parents to their offspring. This circumſtance may be advanced as an argument againſt the opinion of its proceeding from the introduction of acids. If it be hereditary, how can it be conſidered as ariſing from a redundancy of acid, when all are expoſed to the effects of acids?

THE occaſional abſorption of a ſmall quantity of acid is not ſufficient for producing any conſiderable alteration in the urine. The precipitation ariſing from it, when diluted by the great maſs of the circulating fluids, will not appear of conſequence. For the formation of Gravel, and of calculi, there is requiſite an exceſſive, or an habitual influx, to which a tendency will be found to be hereditary.

IN the firſt place, the habit of drinking is in ſome degree hereditary. Propenſities to particular paſſions appear frequently to depend upon peculiarities in the ſyſtem, and are obſerved to run in families. We are likewiſe to remember, that from the influence of example, an inclination to this vice is apt to be acquired by the children

dren of thoſe who have been addicted to it. It is evident then, that the diſeaſes attending upon it, might, without much impropriety, be conſidered as hereditary.

But the acids in wine, or in punch, are not more active in producing Gravel than theſe generated by fermentation in the ſtomach; and a tendency to acidity from a weakneſs in the digeſtive powers, is in the moſt pointed degree hereditary. A want of tone in the ſtomach has always been conſidered as conſtitutional, and it is the great hereditary ſource of urinary concretions.

A conſtant practice of uſing acids in quantities, or a perpetual tendency to acidity from fermentation in the primæ viæ,

are ſeldom unaccompanied by ſome degree of nephritic affection. Under particular circumſtances, however, their influence in producing it is greater than under others. The evacuation of the redundant acid from the ſyſtem will take place differently in different habits, as the tendency to contraction or relaxation in particular emunctories is different. In one, the greateſt part of it will be carried off by the glands of the inteſtinal canal; in another, by the ſurface of the body; and in a third, by the kidnies. Suppoſing then, that there is a given quantity of acid in the circulation, the tendency to Gravel, *cæteris paribus*, will be greater in the laſt caſe than in either of the others. There may, in this reſpect, be a difference between the kidnies themſelves,

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or in the ſame kidney at different periods.

Another circumſtance productive of much variation, is the exerciſe that is employed. The chryſtallization of the concreting matter in the urine, is promoted by a ſtate of reſt, and therefore the ſedentary are peculiarly liable to have nephritic affection. It ariſes in them from a redundancy of acid that would not produce any uneaſineſs in a labouring man.

If Gravel may be derived, in ſome inſtances, from the production in the ſyſtem of a preternatural quantity of the concreting acid unconnected with the abſorption of acids, the tendency to it will be much increaſed when theſe ſources may

happen to be conjoined. For the depoſition of this acid in the kidnies and in the bladder, the redundancy muſt be to ſuch a degree as that the urine ſhall be inſufficient for retaining the whole in ſolution while in the body. A leſſer redundancy, although it may appear as a preternatural ſediment when the urine ſhall have become cold, cannot produce concretions. Theſe then, in whom the proportion of this acid is naturally greateſt, will be moſt liable to ſuffer from other acids when introduced into the circulation.

In the urine, during nephritic affection, there is frequently diſcovered a ſabulous matter as ſoon as it is evacuated, eſpecially when it has been at reſt for a conſiderable time in the bladder. Not un-

uncommonly, however, the concreting acid, although detached, is yet in ſolution, but it is depoſited after ſtanding for an hour or two; and very often as a lateritious ſediment, deſtroying the tranſparency of the urine, and ſometimes giving to it the colour of a ſtrong decoction of Peruvian bark.

The urine with a ſediment from a preternatural redundancy of the concreting acid, is frequently diſtinguiſhed by a pellicle on the ſurface reflecting the rays of light in the ſame manner as oil when poured upon water. The veſſel in which it has ſtood has the appearance of being lined with a fine membrane, ſometimes white, and at other times of a reddiſh caſt. Upon the application of a proper degree

degree of heat, the acid is redifſolved, and it is depoſited when the urine has become cold a ſecond time, in the ſame form as before. The tendency of the acid to produce chryſtals, muſt be obviated by its being mechanically blended, or chemically combined with a ſmall portion of ſome other matter, in regard to the nature of which we cannot be poſitive, but we have conceived it to be mucilagenous.

It is probable that the chryſtallization of the concreting matter in the urinary paſſages takes place principally during the night, when the urine that has been ſecreted is free from agitation. If a chryſtal ſhould not be diſcharged ſoon after it has been formed, it muſt, by the addition of freſh matter, increaſe in ſize; and by af-

affording a dead ſurface for the particles to ſhoot upon, it will tend very much to forward the future chryſtallization. After ſome time it will become too large to be paſſed along the ureters or the urethra. It is a fortunate circumſtance, however, that they are generally carried away with the current of the urine before they have arrived at this magnitude; as the ſmalleſt chryſtal remaining in the kidnies or in the bladder muſt become a nucleus, upon which the redundant acid will accumulate until a ſtone is produced. The violence done to the paſſages in the evacuation of Gravel is a trifling evil when compared with the complicated miſeries attending upon a confirmed calculus.

THE growth of a ſtone is not always equally rapid, but will be in proportion to the redundancy of acid, the degree of agitation in the urine, and the length of time that it ſhall be retained after it has been ſecreted. The varieties in the colours of the lamina may proceed from any adventitious matter attaching itſelf to the redundant acid. The texture will be firmeſt when the chryſtallization has not been much interrupted by the motion of the body, or by the viſcidity of the urine from mucus or any other cauſe. It may be concluded, that the concreting acid is in the greateſt purity in ſuch concretions as have in appearance the neareſt reſemblance to the red chryſtals.

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The ſhape of a ſtone will depend upon its ſituation, and upon the form of the nucleus. A concretion in the kidney will adapt itſelf to the figure of the pelvis of that gland. When two or three ſmall chryſtals have been united together in the bladder ſo as to form an irregular nucleus, the ſurface will continue to be irregular, and when cut into, the lamina will be found to run in an uneven direction. The irritation from a concretion of this kind muſt be greater than from a ſmooth one.

We ſhall conclude our remarks on the cauſe and progreſs of urinary concretions, with obſerving, that the irritability of the urinary paſſages in ſome is much greater than in others. The urine of many who

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are not much affected with the ſymptoms of Gravel, will be found to contain in common a conſiderable redundancy of the concreting acid. There are inſtances of calculi even having been endured for a length of time without much uneaſineſs.

PART

PART II.

ON THE CAUSE AND PROGRESS OF GOUT.

SECT. I.

On the Production of Gout.

A PRECIPITATION of the concreting acid in the fluids is attended with prejudice to other parts of the ſyſtem, as well as to the urinary paſſages. As ſoon as the acid has been detached from the ſubſtance with which it was combined, it

it becomes a ſpecies of matter to the action of which the body is unaccuſtomed, and when the redundancy is very conſiderable, a depoſition of the particles will take place in the blood-veſſels, ſo as to give an interruption to the freedom of the circulation. In conſequence of this interruption, there frequently ariſes a peculiar affection of the inflammatory kind, and that affection is GOUT.

THERE is ſometimes in the kidnies an appearance which ſufficiently evinces the poſſibility of an obſtruction in the veſſels from a preternatural redundancy of the concreting acid. A quantity of ſabulous matter has been found in the *tubuli uriniferi* within the very ſubſtance of theſe glands: a depoſition, therefore, of the

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ſame kind may take place in the veſſels of other parts. If the redundant acid be in ſuch quantity that the fluids are inſufficient for keeping the whole of it in ſolution, the particles muſt inevitably get into a ſolid form. An obſtruction from this cauſe is as obvious as any that can take place from ſpaſm, and an obſtruction from ſpaſm has been conſidered as a principal ſource of diſeaſe.

Of the affections attributed to ſpaſm, one of the moſt conſiderable is Rheumatiſm, and the production of Gout may be illuſtrated by a reference to it. An impediment to the circulation is the proximate cauſe of each, but the circumſtances producing that impediment are different. In the firſt, it ariſes from the diminiſhed ſize

of the veſſels themſelves: in the ſecond, from the preſence of an uncommon matter. In both, however, it has the effect of occaſioning an increaſed impetus of the blood, by which the obſtruction is at length overcome, and the circulation reſtored.

In different parts of the body there is a tendency to admit of obſtruction of the one kind more readily than of the other. An obſtruction from an unuſual contraction in the veſſels, will be moſt apt to take place in parts that have in themſelves a principle of motion. It cannot, indeed, be conceived to happen without preſuppoſing a power of action. An obſtruction, however, from an alteration of the fluids will principally be felt in parts where the veſſels

veſſels are naturally ſmall, their ſize ſtationary, and the circulation in them leaſt rapid. Accordingly we find, that the muſcles and the ſkin are moſt frequently affected with rheumatiſm; the tendons, ligaments, and membranes with Gout.

The capillary veſſels of a muſcle are larger than theſe of tendinous and ligamentous parts. When free from ſpaſm, they are capable, likewiſe, of a much greater degree of diſtention, ſo as to be adapted to the nature of their contents; while, by the inherent power of action in the fibres, the particles of any obſtructing matter are propelled.

A tendon, on the other hand, is a paſſive inſtrument, of which the veſſels are

too fine to admit even the red particles of the blood, and at the same time they are so very tense, that they cannot, without considerable violence, allow of any increase in their dimensions. From their state of indolence, they are without the means of applying any additional force when it may be requisite for maintaining the freedom of the circulation. The redundant acid yet in solution in the thinner fluids, the serum and the water of the blood, may insinuate itself into the vessels of such parts, and ere it can escape from them, a portion of it may have been deposited. The particles already in a solid form being too large to gain admittance, will be arrested upon the surface, where they may accumulate until little calculi are formed.

In this manner, from a difference between theſe affections, the greater ſuſceptibility of rheumatiſm in ſome parts, and of Gout in others, is eaſily accounted for. The diſeaſes are diſtinct in their origin, but there is ſome degree of affinity in their progreſs, and in many caſes they appear to run into each other. Obſtruction from the concreting acid may take place in the ſubſtance of a muſcle, eſpecially when under a ſtate of ſpaſm. It may be affected, likewiſe, ſympathetically from an obſtruction in its tendon; or *vice verſa*, a tendon from ſpaſm in the veſſels of the muſcle to which it belongs. There would then be Gout aſſuming the appearance of rheumatiſm, or rheumatiſm having a reſemblance to Gout. The inſtances in which they are thus blended,

appear frequently to occur. A contraction from cold producing reaction has been conſidered by men of the firſt reputation as the eſſence of rheumatiſm; but a complaint of a ſimilar kind is very often derived from a redundancy of acid. It is probable that the tendency to rheumatic ſpaſm may be increaſed by the preſence of the redundant acid, and the affection may be rheumatiſm, although the greater diſpoſition ſhould have ariſen from the other circumſtance.

A want of freedom in the circulation is ſo much indicated by ſeveral appearances in Gout, that the diſeaſe has, by many before this time, been conſidered as proceeding from obſtruction in the veſſels of the part affected, and the obſtruction

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was frequently attributed to ſomething that was termed Gouty matter. In books of medicine we are perpetually reading of this matter, yet there is not in phyſic any other expreſſion of which the meaning is leſs determined. The ideas concerning it were ſo vague, and the opinions ſo very different, that of late it has been entirely rejected by the moſt eminent of the profeſſion. They are unwilling to admit the influence of a matter reſting upon ſuppoſition merely, for it is contended that no proof has been adduced of its exiſtence; and they have combated the doctrine, by oppoſing to each other the contradictory ſentiments of theſe who ſupported it. The objections were undoubtedly of weight, but they are now removed. The concreting acid to which we have aſcribed

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the obſtruction is not a viſionary matter. From requiring a large quantity of water for its ſolution, and from its tendency to be depoſited in a chryſtalline form, it is of all others the ſpecies of matter beſt adapted for producing obſtruction in the veſſels of a living animal. It is an obſtructing matter, not ſpringing from hypotheſis like many ſuppoſed cauſes of obſtruction, but of ſuch a nature as to admit of being demonſtrated in the moſt ſatisfactory manner.

If any man be unwilling to give his aſſent to obſtruction from the cauſe that we have aſſigned, I would aſk him, upon what principle his refuſal is grounded. When the redundant acid ſhall be more than ſufficient for the ſaturation of the fluids,

fluids, by what means can its concreting tendency be counteracted, or in what manner ſhall it be diſpoſed of until evacuated? Can it be ſuppoſed to continue in the circulation without interrupting the courſe of it? When we conſider the indolent condition of many parts, and the extreme minuteneſs of their veſſels, it will appear impoſſible that a matter of this kind ſhould be received into them without producing obſtruction: and if the obſtruction be granted, we cannot wonder that it ſhould occaſion that peculiar alteration in the actions of the body conſtituting Gout. In attributing this diſeaſe to a redundancy of acid, we have been enabled to eſtabliſh the operation of its cauſe upon the ſyſtem, and I am perſuaded that hereafter the production of it will

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be looked upon as leſs intricate than that of the greateſt number of morbid affections.

A confirmation of our theory may be obtained from the practical obſervations of the medical authors in higheſt repute. They appear, in general, to have ſuſpected a connection of ſome kind between Gravel and Gout. The children of nephritic and of gouty parents were obſerved to inherit ſometimes the one, and ſometimes the other. Concretions not unlike to theſe from the urinary paſſages were often found in the joints, and in other parts of the body, after the paroxiſms of Gout. The two diſeaſes were frequently united in the ſame perſon, and the ſame

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remedies have been found beneficial in both.

The ſuppoſed cauſes, likewiſe, were nearly ſimilar. Gout as well as gravel has been attributed in many caſes to an exceſſive uſe of acids; and it has been conſidered as intimately connected with that ſtate of the ſtomach in which there is an almoſt perpetual generation of acid. At the ſame time, however, a variety of circumſtances of a different kind have been enumerated as ſources of it. If we examine with attention the condition of many in whom Gout makes its appearance, we ſhall find that theſe other circumſtances have only been productive of it when they have had the previous effect, by impairing the digeſtive faculties, of cauſing

cauſing a tendency to the generation of acid in the primæ viæ. Of this nature are inſobriety, luxury, indolence, and voluptuouſneſs. The diſeaſe frequently attends upon a habit of drinking, on account of the acids conveyed into the body by means of it: but when ſpirits without acid have been employed, it has not, in general, taken place while the ſtomach retained its tone. The tendency of different liquors to produce it is not ſo much in proportion to their ſtrength, as to the quantity of acid in their compoſition. This obſervation is warranted by the experience of ages, the liquors in which acid predominates having been invariably conſidered as peculiarly prediſpoſing to gouty affection. By intoxicating compounds of any kind, when uſed with too much

much freedom, by a life of luxury, by a ſtate of indolence, and by an inordinate purſuit of pleaſures, the powers requiſite for the proceſs of digeſtion are at laſt brought into diſorder, and the vegetable part of the diet is permitted to run into the acetous fermentation. Theſe and other ſuch circumſtances, as tending to vitiate the action of the ſtomach, and of conſequence conducing to the formation of acid, may be looked upon as remote cauſes both of Gout and of Gravel.

An imperfection in the digeſtive faculties when connected with the uſe of aceſcent aliment is a moſt fertile ſource of theſe diſeaſes, and Gout for the ſame rea-

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ſons as Gravel may be conſidered as an hereditary affection.

VAN HELMONT, and others, who have been of opinion that Gout proceeded from acidity in the veſſels, were unacquainted with the concreting acid, and the conſequent precipitation of it from the introduction of any other acid. This peculiar ſubſtance is a conſtituent part of our fluids, concerning which nothing was underſtood. The proportion of it when greateſt is minute, but by a knowledge of its properties it is raiſed to very high importance in the animal œconomy, and two diſeaſes, of which the production has hitherto been conſidered as myſterious, are clearly accounted for. It is a ſpecies of matter,

matter, by which the attention of phyſiologiſts and of pathologiſts will in future be engaged in a very peculiar manner.

SECT.

SECT. II.

On the State of the Body moſt favourable to Gout.

A Redundancy of the concreting acid, giving occaſion to obſtructions in particular parts of the body, is in general to be aſcribed to the introduction of a foreign acid. It has, however, already been obſerved, that a redundancy may ſometimes ariſe from other cauſes, and one of theſe is the actual production of a preternatural quantity either of this acid, or of the other native acids. The proportions of the ſaline matters in the circulation, are

are liable to variations from ſources with which we are unacquainted; therefore we would not go the length of aſſerting that Gout is never derived from an inequality in this reſpect, unconnected with the abſorption of acid. But the latter circumſtance is ſo frequently conjoined with this diſeaſe, as well as with Gravel, that in by much the greateſt number of caſes, both may be attributed to it. It is not likely that a redundancy from an increaſed production of the acids eſſential to the ſyſtem, ſhould often be of ſufficient permanence for cauſing obſtruction.

We admitted, likewiſe, of a redundancy in ſome inſtances from a mere accumulation of this matter, when it is prevented from being freely diſcharged

by a tendency to contraction in the emunctories. I have doubts whether or not a redundancy from ſimple accumulation is ever of itſelf the occaſion of Gout, but when at the ſame time there is an habitual precipitation from an influx of acid, the redundancy becomes greater than under any other circumſtances. It continues to increaſe until the fluids are overloaded, ſo that a depoſition of the particles muſt inevitably take place. An accumulation, therefore, is extremely conducive to the production of this affection.

When the ſecretion by the various glands is eaſy and rapid, there never can be any conſiderable redundancy, as the acid will be evacuated from the circulation as faſt as it is detached. But, on the other

other hand, when there is a diſpoſition to contraction in the ſecretory veſſels throughout the body, the redundancy may become great from a very gradual introduction of acid. The effects from a conſtant influx of a given quantity of acid, are, for theſe reaſons, very different in different conſtitutions. In one, the concreting acid, when precipitated, will immediately be got rid of: in another, it will be retained in the veſſels until the courſe of the circulation be interrupted by it. In the firſt inſtance, there might be an exceſſive uſe of acids, or a frequent generation of acid, without a ſymptom of Gout; in the ſecond, that diſeaſe would be apt to ariſe although the other circumſtances were in a much leſs degree.

In Gouty patients there is, in general, a very evident tendency to accumulation in the veſſels. They are uſually of a coſtive habit, their urine is in ſmall quantity, and for ſome time preceding the fit, there is a diminution of the ſecretion from the ſurface of the body. The evacuations not being in proportion to the ſupplies, they are frequently affected with plethoric ſymptoms. There is an apparent contraction in all the emunctories. A deficiency of ſecretion, therefore, may be conſidered as prediſpoſing to Gout. It ſeldom takes place, except when there has been an accumulation of the redundant acid; and, on this account, it has very often the appearance of alternating with Gravel. When, from the contracted ſtate of the veſſels in the kidnies, the

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creting matter is prevented from paſſing freely with the urine, it accumulates until arthritic ſymptoms are produced. As ſoon, however, as a relaxation has taken place, the uneaſineſs in the joints is ſucceeded by nephritic affection.

In warm climates, notwithſtanding the practice of conſuming great quantities of acid, the inhabitants are not much affected with Gout, becauſe there is always a very profuſe evacuation from the ſurface of the body, and not uncommonly from the inteſtinal canal. The efficacy of exerciſe in preventing this diſeaſe, is owing in a great meaſure to its producing an increaſe of ſecretion, by which any accumulation of the redundant acid is guarded againſt.

It is evident then, that the redundancy of acid, and the obſtruction ariſing from it, muſt depend very much upon the ſtate of the emunctories. But ſuppoſing that there ſhould be a given redundancy, and a certain degree of obſtruction, the influence of theſe in producing Gout, will not always be the ſame. In Mr. Hunter's moſt excellent Treatiſe upon the Venereal Diſeaſe, a principle of great importance in the animal œconomy is clearly eſtabliſhed, of diſeaſed actions being incompatible with each other. The ſpecific cauſes of diſeaſe produce their ſpecific effects, with the greateſt regularity, upon theſe in whom there was no previous tendency to any one diſeaſe; for in peculiar habits, in which there is a propenſity natural or acquired to go into peculiar

culiar modes of action, every cauſe of diſeaſe will frequently give occaſion to that particular affection to which the ſyſtem was of itſelf inclined. Diſeaſed actions of a different kind being incompatible, a prevailing diſpoſition to any other diſeaſe will prove a hindrance to the taking place of Gout, and the redundant acid, when accumulated, may have the effect of aggravating merely ſome habitual diſorder.

This very extenſive principle will aſſiſt in accounting for the greater or leſs influence of acids under particular ages, climates, and ſituations, becauſe to the varieties of theſe, there are annexed natural propenſities in the ſyſtem to peculiar affections. The action, for inſtance,

of Gout, and that of an ague, or of a dyſentery, could not exiſt together in the body, but that one to which the diſpoſition happened to be leaſt powerful muſt yield to the other.

Although Gout and Gravel are both derived from a redundancy of acid, it does not follow that they ought always to go together; but, on the contrary, from the circumſtances pointed out, it is clear, that one or both may be abſent, even when the redundancy is conſiderable. Accordingly we find, that in many inſtances Gout makes its appearance without being attended upon by Gravel; and ſtill more frequently Gravel without any ſymptoms of Gout. They ſpring from the ſame ſource, but from a difference in the

the parts affected, the means by which their production is promoted or obviated are in ſome reſpects different. For the proof of this remark, we may recur to the obſervation ſo lately made, of an eaſy ſecretion by the kidnies, while it prediſpoſes to the formation of urinary concretions, tending to prevent Gout by removing the redundant acid as faſt as it is detached; or, *vice verſa*, of a deficiency in the evacuation by theſe glands being favourable to obſtruction, as cauſing the acid to be retained.

It has, in general, been remarked that the moſt robuſt are peculiarly liable to be affected with Gout. It might be expected that ſtrength in other parts would be accompanied with a proportionate vigour in the digeſtive powers.

powers. But this does not always appear to be the caſe; for, on the contrary, men of robuſt habits are very often ſubject to diſorder in the ſtomach. In theſe of large bodies and of great apparent ſtrength, there is, not uncommonly, a natural tendency to indigeſtion. It is, likewiſe, to be conſidered, that ſuch men, from entertaining too high an opinion of their own conſtitution, are peculiarly apt to fall into the various irregularities ſo prejudicial to the tone of the ſtomach. From this circumſtance, the great ſources of Gout, an exceſſive uſe of acids and acidity from fermentation in the primæ viæ, are frequently conjoined. When, at the ſame time, there is a deficiency of ſecretion, the diſeaſe muſt infallibly be produced.

Acids introduced into the circulation, and ſecreted by the kidnies, may produce Gravel at any time. Urinary concretions are frequently met with at a very early period, eſpecially in the children of the poor, whoſe ſtomachs have been loaded with ſour fruits and aceſcent vegetables. Gout ſeldom takes place till after the prime of life. In youth there is a freedom of ſecretion, and a natural diſpoſition to the uſe of exerciſe, by which any accumulation of the redundant acid is prevented.

From the cuſtomary moderation of women in eating and drinking, they come, in a much leſs degree than men, within the influence of the circumſtances from which Gout is derived. In the female habit,

habit, likewiſe, there is a greater tendency to relaxation in the emunctories, ſo that any redundant acid will be diſcharged without accumulating, but if it paſſes off by the kidnies, their ſedentary manner of living is extremely favourable to the production of Gravel.

SECT.

SECT. III.

On a Paroxiſm of Gout.

WHEN the freedom of the circulation is interrupted by the redundant acid, the taking place of the conſequent inflammatory affection may be forwarded by a variety of circumſtances. The injury to the ſyſtem from the obſtruction will be augmented by every thing producing an increaſe of action, or by an uncommon exertion of any kind. It frequently happens, that a fit of the Gout is ſuddenly brought on by unuſual repletion, by the uſe of ſtimulants, or by a greater

greater degree of exercise than the body has been accustomed to. These, and other such circumstances, have been termed the occasional causes of this disease.

Gout, in like manner as other inflammatory disorders, is most apt to occur in the vernal and autumnal seasons. The heart and the principal arteries, stimulated by the increase of heat in the spring, propel the blood with unusual force; but the extreme vessels having acquired a habit of contraction, are with difficulty distended, so that resistance is given, and plethora takes place. By a continuance of warm weather relaxation upon the surface is at last produced, and the plethoric symptoms disappear, until the external

nal circulation is checked by the returning cold in autumn. The blood is then thrown in greater quantity upon the interior parts ſo as to cauſe a reaction, giving a tendency to inflammatory complaints. Thus the heat in the ſpring, and the cold in the autumn, are attended with conſequences in ſome reſpects ſimilar, and Gout is moſt frequent at theſe ſeaſons. The obſtruction may continue longer at any other time of the year without producing inflammation.

The circumſtances already mentioned, as prediſpoſing the tendons and ligaments to admit of obſtruction from the redundant acid, are ſtrongeſt in the lower extremities. The feet being fartheſt removed from the centre of the circulation, the

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force of the heart muſt be in a great meaſure ſpent before the blood can get to ſo great a diſtance, and the perpendicular ſituation of the body is unfavourable to its return by the veins. The fluids, therefore, in them are nearer to a ſtate of ſtagnation than in other parts, and there is leſs of that power by which any thing tending to produce diſeaſe is reſiſted and counteracted. For theſe very obvious reaſons, the tendons and ligaments about the toes and the metatarſal bones, are more liable to be affected with Gout than parts of the ſame kind in other ſituations.

A paroxyſm of Gout is uſually preceded for ſome weeks by flatulency, want of appetite, and other ſymptoms of diſorder

diſorder in the ſtomach. During the continuance of theſe, the acetous fermentation is taking place in the primæ viæ, ſo that there is a conſtant influx of acid from the inteſtinal canal. The concreting acid is detached by this foreign acid, and if at the ſame time there be a deficiency of ſecretion, it accumulates in the fluids. When the redundancy has got to a certain pitch, obſtruction from a depoſition of the particles commences, and it is indicated by a variety of ſymptoms, ſuch as an unuſual languor, coldneſs in the extremities, an uneaſy ſenſation frequently compared to that of pricking in the feet and legs, with numbneſs and ſpaſmodic affections of the muſcles. Under theſe circumſtances, the gouty inflammation

will ſometimes be excited by very ſlight ſtimuli, and it ariſes in the ligaments about the feet. If the appetite ſhould return in conſequence of any abatement of the diſorder in the ſtomach, the greater quantity of food that is employed, not uncommonly, gives occaſion to an immediate paroxiſm. From this circumſtance probably, an obſervation frequently made by medical authors, of the appetite having been unuſually great on the day preceding the fit, may have originated.

When Gout has been derived from acids received into the ſtomach, the paroxiſm ſometimes makes its appearance without any conſiderable warning from diſorder in the digeſtive faculties. It is preceded, however, by the ſymptoms which point

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out an impediment to the circulation, and in conſequence of theſe the ſtomach may be ſympathetically affected.

It is not our intention to enter minutely into the deſcription of a paroxiſm, or into the progreſs of Gout. For information in regard to theſe, application may be made to the Treatiſe of Dr. Sydenham, from which the accounts of many ſucceeding authors have been extracted. We ſhall touch upon the leading features only of this peculiar affection.

The circumſtance conſtituting the diſeaſe, is an inflammation in parts of which the functions have been interrupted by the redundant acid; and it is moſt frequently excited in the tendons and li-

gaments about the feet, becauſe in them the interruption is greateſt. There ariſes from it a very acute pain, and the increaſe of action is communicated, not only to the veſſels of the ſurrounding parts producing ſwelling and redneſs, but in a greater or leſs degree to the heart, and to the whole arterial ſyſtem. By means of the augmented impetus of the blood the obſtruction is in a ſhort time overcome, and the tendency to contraction in the various emunctories removed. The ſecretion from the ſurface of the body becomes very often profuſe, and the redundant acid, which till then had been prevented from paſſing off by the kidnies, appears in the urine as a lateritious ſediment. When the relaxation has continued for ſome days, the whole of the accumulated

acid

acid is diſcharged, the increaſed action ſubſides, and every thing returns to its natural condition. The fit is then ſaid to be over.

When a regular paroxiſm has had its courſe, the patient, for the moſt part, is left in more perfect health than he had enjoyed for ſome time before. This effect has led many to conſider Gout as having a peculiar property of reſtoring the vigour of the ſyſtem. That, however, was an unfair concluſion. Of itſelf it cauſes a diminution of ſtrength; but by removing every morbid affection, it puts the ſyſtem into a diſpoſition for acquiring vigour. From the incompatibility of diſeaſed actions with each other, it proves a very univerſal remedy for chronic

chronic complaints that were the ſource of permanent debility, and the temporary weakneſs occaſioned by it is ſoon recovered. Upon the ſame principle a fever might be ſaid to have the property of giving ſtrength.

THE tendency to diſorder in the ſtomach, and a multitude of ailments proceeding from it, are corrected by a paroxiſm of Gout. We cannot ſufficiently admire the excellent contrivance of nature, by which many diſeaſes become the inſtruments of removing the circumſtances that produced them. The digeſtion is often perfect for ſome time after, and the ſecretions in their natural ſtate. At length, however, a pronneſs to acidity, with nauſea, want of appetite, and flatulency, begin

begin to be perceived; the concreting acid accumulates again, and much inconvenience is endured from a variety of irregular ſymptoms. Under theſe circumſtances, it has frequently been thought adviſeable to employ ſtimulants for the purpoſe of exciting the inflammation, that the other complaints might be relieved by it.

The inflammation of Gout has a diſpoſition to confine itſelf to the part where it has commenced, as an action ſo acute cannot well take place in many parts at the ſame time: if it be reſiſted, however, by any circumſtance, it will in general be produced in ſome other ſituation. When it has been counteracted in the lower extremities, it frequently diſcovers

itſelf in the joints of the fingers, in the elbow, in the coats of the ſtomach and inteſtines, in the viſcera of the thorax, in the integuments of the head, in the brain or its membranes; and as often as it is checked in one part it makes its appearance in another. Theſe ſudden removals have been accounted for, by ſuppoſing that the matter which had been depoſited was taken back into the circulation and conveyed to the part next affected. But an inſtantaneous tranſlation of this kind cannot readily be aſſented to, nor would much aſſiſtance be received from it. We are to conſider, that there muſt be actual obſtruction from the redundant acid in many different parts, although not equally great in all; a tranſlation, therefore, of matter is unneceſſary for explaining the

the changes from place to place. If the diſeaſe be counteracted in theſe parts which are moſt inclined to fall into it, the occaſional cauſe will operate ſo as to excite it in a ſituation where the original tendency was leſs conſiderable. In like manner in rheumatiſm, removals are nearly as frequent, although any tranſlation of matter has ſeldom been ſuſpected. This diſeaſe, when reſiſted in one part very often ariſes in ſome other, to which a previous diſpoſition to ſpaſm had been communicated.

In Gout, the inflammation is always moſt acute when within narrow compaſs; and when very acute, its term of duration is ſhorteſt, and its operation upon the ſyſtem moſt complete. When it ſubſiſts

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in ſome degree, in many ſituations, the ſymptoms are leſs violent, but the progreſs more tedious, and the concluſion leſs ſatisfactory. For the perfection of a regular paroxiſm, a certain degree of power in the ſyſtem is requiſite. In conſtitutions very much debilitated, the affection is not confined to the feet, but it appears in other parts of the body, and hangs about the patient, producing chronic weakneſs. The diſorder in the ſtomach continues without much alleviation, the redundancy of acid remains undiminiſhed, and the functions of the whole ſyſtem are impaired. During a regular fit the obſtructing matter appears to be removed when the influx of acid has been ſtopped, the ſecretories relaxed, and the redundant acid already in the circulation

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diſcharged; for the tendons and ligaments recover their former flexibility. But, in the other caſe, the depoſition goes on until they are rendered rigid and incapable of motion: or, the concreting matter, accumulating upon their ſurfaces with a mixture perhaps of coagulable lymph, produces calculi. The condition of the unhappy patient is now truly deplorable; as the ſtate of reſt to which he is condemned conduces likewiſe to the chryſtallization of the redundant acid in the urinary paſſages. Nephritic affection becomes more than uſually troubleſome, and he has difficulty in determining, whether his ſufferings are greateſt from Gravel or from Gout. Such is the melancholy termination to which this diſ-

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eaſe is perpetually inclining, as by frequent attacks a ſtate of debility is at laſt brought on in habits originally the moſt robuſt.

PART

PART III.

ON THE PREVENTION AND CURE OF GRAVEL AND OF GOUT.

SECT. I.

That theſe Diſeaſes may be prevented and cured by guarding againſt a Redundanc of Acid.

FROM an uncertainty in regard to the cauſes of Gravel and of Gout, the endeavours at prevention have ſeldom been ſuc-

ſucceſsful, and in ſome caſes prejudicial. When any doubt is entertained as to the ſource of a diſeaſe, the principal reliance ought to be placed in experience and obſervation. The moſt ſenſible of the profeſſion, acting under the guidance of theſe, have cautioned their nephritic and gouty patients againſt acids and aceſcent vegetables. The practice, however, of others leſs diſcerning, has been accommodated to opinions conceived from very inaccurate experiments, and their regulations have been pointed againſt a ſuppoſed alkaleſcency in the fluids. For the prevention of theſe diſeaſes, and for the ſolution even of calculi, a regimen conſiſting almoſt entirely of acids and of ſubſtances tending ſtrongly to the acetous fermentation, was recommended by Dr.

Lobb.

Lobb. Acidity with him was the teſt of a ſolvent.

The circumſtances producing Gravel and Gout, had for ſo long a time eluded every effort of ingenuity that was made to inveſtigate them, that many have deſpaired of their being diſcovered. In attributing theſe affections, however, to a redundancy of acid, the phenomena of each are ſo conſonant with reaſoning deduced from chemical facts, that we may conſider their remote cauſes as clearly eſtabliſhed, and in guarding againſt theſe the ſyſtem of prevention muſt conſiſt. It is indeed the only method of preventing diſeaſes that can be purſued with advantage.

In treating of the cure a diſtinction is to be made between the management during the fits, and the means of ſecuring againſt future attacks. Having nothing new to offer upon the firſt of theſe objects, it is unneceſſary to enter into it at any length, but an idea of the general practice may be communicated in a few words.

The nature of the ſymptoms ariſing from a concretion, or from Gravel in the urinary paſſages, are eaſily comprehended. The violence of them is often ſo great, that the moſt powerful means of obtaining temporary relief become neceſſary, and the remedies of greateſt efficacy, are the warm bath, occaſional bleeding, opiates, glyſters, gentle laxatives, and the medi-

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cines tending to diminiſh pain, and to take off irritation. Aqueous fluids, with which it has been cuſtomary to join gummy and mucilagenous ſubſtances, have been found of ſervice. They have the effect of increaſing the quantity of urine, ſo that a portion of the redundant acid, which otherwiſe would have been depoſited, is retained in ſolution. By ſuch methods the urgency of the ſymptoms may be alleviated; but for procuring permanent relief, the ſame regulations are to be followed as for the prevention of the diſeaſe.

If the inflammation of Gout be counteracted in any part by artificial means, there is danger of its being transferred to ſome other part of greater conſequence to

the ſyſtem. When it has taken place in the feet, or in any ſituation where it cannot be attended with alarming ſymptoms, every circumſtance by which it might be checked muſt be cautiouſly avoided: but if an attack be made upon an organ, of which the functions are eſſential to life, it becomes neceſſary to employ methods of moderating its violence, and of fixing it, if poſſible, in ſome part of leſs general importance. Under theſe intentions is comprehended nearly the whole treatment during a paroxiſm, and the means of carrying them into effect, are ſo generally underſtood that it is unneceſſary to go into the detail of them.

THE danger of counteracting a paroxiſm by internal remedies or external applications,

plications, is rendered very evident by a knowledge of the cauſe. If the inflammation be reſiſted, more ſerious conſequences may be apprehended. But when a paroxiſm has produced its full effect upon the ſyſtem, we may guard againſt future returns, by removing every circumſtance from which they might be derived. In this manner the diſeaſe may be radically cured without any riſk being incurred.

As a preternatural redundancy of the concreting acid giving occaſion to Gravel and Gout, appears in moſt caſes to have ariſen from the introduction of foreign acids, the means of prevention muſt be pointed againſt the latter circumſtance,

and they may come under three diviſions, viz.

1ſt, Abſtinence from acids.

2dly, The prevention of acidity from fermentation.

3dly, The deſtruction of the acid.

SECT.

SECT. II.

On Abſtinence from Acids.

THE acids produced by fermentation, and the native acid of fruits and vegetables, are more frequently conveyed into the ſtomach than any others. They are the acids which we are apt to uſe in greateſt quantity, becauſe the compoſitions in which they abound are very grateful to the palate.

In liquors that have undergone the vinous fermentation, there is, in general, more or leſs of the acid of tartar and of

ærial acid. In another part of this treatiſe we have expreſſed a doubt whether or not the latter can be conveyed into the circulation in ſufficient quantity for producing any conſiderable effect, but the wines in which the proportion of the former is greateſt, have been found exceedingly conducive to the taking place of arthritic and nephritic complaints. A total abſtinence from wine is ſcarcely to be expected, as a man mingling with ſociety muſt be at perpetual variance with his inclinations if he refrains from it entirely. There cannot, however, be much hardſhip in ſuffering ſome reſtriction in the choice of wines, eſpecially as theſe which are moſt proper, will not be found to be the leaſt agreeable.

The liquors in which ærial acid predominates are eaſily diſtinguiſhed by their peculiar briſkneſs, but there is ſome difficulty in aſcertaining the quantity of tartar. It may be obſerved, however, as a pretty general rule, that theſe in which the proportion of ſpirit is greateſt, appear to contain leaſt of it. Being inſoluble in ſpirit it is depoſited in the caſk.

In conſidering of wines, their age is of great importance to be attended to. In new wines, there is commonly a quantity of the native acid of the grape, which, after a length of time, is deſtroyed by fermentation. The ſmall bodied wines require, in general, to be conſumed before the fermentation is compleated, and on this account, likewiſe, they are liable

to the greateſt objections. Any fermented liquor in which acidity is ſenſible to the taſte muſt be pernicious. The beſt wines are Madeira, Sherry, and Port. Theſe, when arrived at a proper age, may be uſed in moderation; but Claret, Champaigne, and other ſmall wines in which the proportion of acid is very conſiderable, muſt be entirely rejected. They never can be indulged in with impunity. It has always been remarked, that the proportion of calculous patients in Paris is infinitely greater than in London. Gout, likewiſe, or a rheumatic affection having a reſemblance to it, is ſaid to be very common in many of the French provinces, where wines of a moſt dangerous tendency are conſumed.

THE fermented juice of apples is exceedingly conducive to the production of arthritic and nephritic affection. Perry, likewiſe, and hard ales are very prejudicial. They muſt be altogether prohibited.

NEUMANN, whoſe experiments are, in general, ſufficiently accurate, has remarked, that there is a portion of acid in malt liquors of every kind. In many the quantity is not very conſiderable, yet when Gout or Gravel are apprehended, it will be better to abſtain from them entirely. In that ſtate of the ſtomach which frequently accompanies theſe diſeaſes, they are extremely apt to be converted into an acid, by running into fermentation. This is an objection to which the

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weaker wines and ſmall fermented liquors of every deſcription are liable.

PURE water, or toaſt and water, may be ſubſtituted for table beer. Water with juſt enough of rum or brandy to give a flavour to it, might be allowed of, but for the fear that the proportions of theſe might be increaſed by degrees until the ſtomach would be injured by them. The habit of employing ſpirits is apt to ſteal upon men by imperceptible advances, until it gets ſo deeply rooted that they have it not in their power to relinquiſh it. Infuſions of herbs, or of woods containing aromatic oils, are grateful to the ſtomach, and may be drank with propriety at meal times.

By a continuance of fermentation, vinous liquors are converted into vinegar. This acid is ſeldom uſed in ſuch quantity as to produce of itſelf a preternatural redundancy of the concreting acid; but when there is already a redundancy, a ſmall portion even of any acid muſt be detrimental; vinegar, therefore, ſhould be rejected.

In the juices of many fruits, and of certain vegetable, there is a quantity of native vegetable acid. It is generally believed, that this ſubſtance is capable of undergoing the proceſs of digeſtion, by which it will be deprived of its acidity. Fruits are ſcattered ſo liberally upon the earth, and the paſſion for them ſo natural

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to man, that we cannot doubt of their having been intended as a part of his food. In the common ſtate of the body they afford nouriſhment, and appear to be conducive to health; but if the digeſtive powers be deficient, they are inadmiſſible on account of their tendency to fermentation. In ſuch caſes they occaſion flatulency, and become ſour in the primæ viæ.

A very diluted ſolution of any ſubſtance is moſt apt to run into the common fermentations in the ſtomach. The objections to fruits may be greatly diminiſhed by joining ſugar with them, but a mixture of their juices with water can ſeldom be endured by any ſtomach. When the

the ſolution of ſugar is concentrated they are leaſt offenſive.

The greateſt quantities of native vegetable acid are apt to be employed in punch, and the diſeaſes of which we are treating frequently proceed from it when uſed under this form. Mixtures of ſpirits and water are leſs injurious than when ſour fruits are conjoined with them.

We have now touched upon the ſeveral methods in which acids are habitually employed. It may admit of diſpute, whether or not any of this claſs of ſubſtances, the native vegetable acid excepted,

cepted, were intended to be conveyed into the ſtomach, as the effects ariſing from them are frequently of the moſt ſerious nature.

When Gout and Gravel have originated from an exceſſive uſe of acids, unconnected with diſorder in the ſtomach, a cure may be effected by ſtrict attention to the regulations laid down. When the uſe of acid has co-operated with the generation of acid in producing theſe diſeaſes, conſiderable advantage will be received from a diminution of the cauſe. A moderate quantity of proper wine having been allowed, there cannot be any hardſhip or inconvenience in abſtaining from acids under every other form;

form ; any man, therefore, who is deficient in this part of the ſyſtem, muſt forfeit his claim to ſucceſs.

SECT.

SECT. III.

On the Prevention of Acidity from Fermentation.

THE proceſs by which the food is converted into chyle, has ſometimes been compared to theſe fermentations which commonly take place in the matter of animals and vegetables when deprived of life; and endeavours have been made to produce a fluid ſimilar to chyle, by expoſing the uſual articles of diet to the influence of warmth and moiſture. It does not appear, however, that ſuch experiments have ever been ſucceſsful.

ful. The action of a living ſtomach is eſſentially requiſite for digeſtion; and when that action is compleat, putrefaction and acidity are reſiſted, even in the ſubſtances that have the ſtrongeſt tendency to theſe changes.

THE production of acid in the alementary canal, muſt be conſidered as a mark of imperfection in the digeſtive powers. It proceeds from a fermentation of the ſame nature as that by which vegetable matter is converted into vinegar; and a method of preventing it, that will naturally occur to every one, is to take care that nothing inclining to the acetous fermentation be received into the ſtomach.

The matter of animals is incapable of becoming acid; therefore it appears to be beſt adapted for the prevention of diſeaſes that ſpring from a redundancy of acid. Animal ſubſtances, however, although not ſuſceptible of the acetous fermentation, have been found to increaſe the tendency of vegetable matter to acidity; and from this cauſe it has happened, that a diſpoſition to the formation of acid in the primæ viæ, has ſometimes been corrected by abſtinence from animal food. If a mixture of animal and vegetable matter be employed at a time when the powers of the ſtomach are deficient, acidity will frequently take place when the vegetable portion by itſelf would have been digeſted. This is a fact which has been

been attended to by very accurate obſervers.

Milk, and the farinaceous matter in the ſeeds of the *gramina* are more eaſily digeſted than any other ſubſtances by which equal nouriſhment is conveyed. On this account, they are peculiarly applicable to nephritic and gouty patients, in whom the tendency to diſorder in the ſtomach is very often exceſſive. The beſt effects might be expected from theſe as the principal articles of diet, when there is a great degree of conſtitutional weakneſs, or when from long habits of irregularity, the digeſtive powers have been very much impaired. They may be uſed in conjunction, and under different forms, ſo as to counterfeit variety. The tendency

of milk to acidity, from which inconvenience would ariſe, will be corrected by the addition of ſolid matter, ſuch as bread, rice, or oatmeal: and when it is employed by itſelf, the ſame intention may frequently be anſwered, by mixing with it two or three tea ſpoonfuls of rum or brandy.

It is not to be expected that many ſhould have reſolution to abide by a regimen from which the greateſt luxuries of the table are excluded: nor does it appear neceſſary to enjoin it in every caſe. When the digeſtive faculties are not ſo entirely exhauſted, the diet may conſiſt of animal food, with the farinaceous ſeeds. The looſer vegetables muſt be rejected, on account

account of their diſpoſition to produce flatulency.

Of animal ſubſtances, theſe diſtinguiſhed by a high flavour are moſt diſagreeable to the ſtomach. Rich ſavoury diſhes cannot be endured in that ſtate of the digeſtive powers which is uſually met with in Gravel and in Gout. They never fail to do miſchief, by increaſing the diſorder, from which the tendency to acidity ariſes. In the ſame manner the acetous fermentation is forwarded by fat meats, by oily ſubſtances, and by butter, altho' they themſelves are incapable of entering into it. It may be obſerved as a pretty general rule, that if two ſubſtances, of which the one only is ſuited to the action of the ſtomach, be employed as food,

the digeſtive will be interrupted by the preſence of the other, for which the powers are inadequate, and the common fermentations will ariſe in both. From this circumſtance it happens, that acidity in the vegetable part of the diet is frequently promoted by articles not of themſelves aceſcent; and ſuch articles are to be avoided, as being exceedingly prejudicial. The lean of beef, mutton, or veal, and any kind of fiſh, or fowl, that is light and eaſy of digeſtion, may be uſed in moderation.

THE effects of many ſubſtances upon different ſtomachs, are ſo various that it is not an eaſy matter to give particular directions concerning diet. In a point of this kind, experience is the ſureſt guide, and

and every man muſt be regulated by his own feelings. Whatever has been found to diſagree, ſhould not afterwards be ventured upon; whereas moſt things which are digeſted without producing diſorder may be employed without any fear of ill conſequences.

THE people of this country are ſo much attached to tea at breakfaſt, that there is difficulty in ſubſtituting for it any thing that would afford equal ſatisfaction. It is moſt apt to become prejudicial, on account of the diſpoſition which it has, in common with every diluted ſolution of ſugar, to run into the acetous fermentation. This objection may be diminiſhed, by joining with it a conſiderable quantity of biſcuit unfermented, or bread, of which

the tendency to fermentation has been corrected by toaſting it. The greater the proportion of ſolid matter, there will be leſs fear of acidity. If, however, notwithſtanding theſe precautions, the ſymptoms of flatulency be perceived in an hour or two after it has been drank, the uſe of it muſt be abſtained from, and ſomething more ſubſtantial may be ſubſtituted in the room of it. Eggs, and many articles frequently put down to ſupper, might be introduced with leſs offence in the morning. A heavy ſupper prevents ſound ſleep, upon which the tone of the ſtomach, and of the whole body, ſo much depends. Lobſters, ducks, and other rich foods, are peculiarly improper at this meal; but milk, with bread or rice, may be employed. Sago, likewiſe, and other fari-

farinaceous ſolutions, are very well ſuited for ſupper.

At dinner, care muſt be taken to keep the appetite within bounds. The uſe of a greater quantity of food than is requiſite for the nouriſhment of the body, conduces very much to diſorder and debility. It has frequently been recommended to eat but of one ſubſtance; and the regulation is of ſervice, becauſe a variety of articles, furniſhed with all the allurements of taſte, lead in general to exceſs. When there is a tendency to diſorder in the primæ viæ, circumſpection is requiſite, as much in regard to the quantity as to the quality of the food. The proper quantity cannot be defined by weight or by mea-

meaſure, but muſt be regulated by the circumſtances of each particular caſe.

It is neceſſary, likewiſe, to give cautions againſt faſting for too long a time. A medium is to be kept up between emptineſs and repletion, as the conſequences of each are alike pernicious. If the interval from breakfaſt to dinner be protracted beyond a moderate period, ſomething ſolid ſhould be employed about two or three o'clock.

A conformity to rule in regard to eating and drinking, is eſſentially requiſite for giving ſucceſs to the meaſures that are purſued. By proper attention to diet, a diſpoſition to acidity may frequently be corrected, but negligence in this reſpect, will

will render every other remedy of no avail.

The proportion of concreting acid produced in the body, appearing, as has been already obſerved, to be different under different circumſtances, it is probable that alterations in the ſyſtem, proceeding from alterations in the diet, may be attended with an increaſe or a diminution of it. At preſent, we are ſpeaking not of the quantity merely in a redundant ſtate, but of the whole that may be precipitated by other acids; and we are uncertain whether it is greateſt in the fluids of a man following a vegetable regimen, or of one ſubſiſting upon animal food. Obſervation alone can aſcertain the ſpecies of aliment moſt conducive to the production

duction of this acid. As yet, knowing nothing of the means by which it is generated, we have only regarded the precipitation of it.

When the digeſtive faculties are conſtitutionally bad, or have been impaired by irregularities, there are various methods by which they may be brought into better condition. A man in the full and perfect enjoyment of theſe faculties, is not obliged to obſerve any nicety in regard to the articles of his diet, but when they happen to be deficient, there is often difficulty in finding any thing that will ſuit. The choice of food is not always in our own power; as the occurrences of life may reduce us to the neceſſity of occaſionally employing ſubſtances moſt adverſe

verſe to our conſtitutions, and repugnant to our wiſhes. If the digeſtive powers can be increaſed, the miſchief from any that is improper, when uſed through neceſſity or inattention, will be leſſened. It is of the utmoſt conſequence to get a habit of indigeſtion corrected, for it is apt to produce in the other functions a general derangement, which becomes a cauſe of its continuance after the circumſtances that gave occaſion to it have ceaſed to operate.

There is not any thing of greater efficacy in reſtoring the digeſtive faculties, than proper exerciſe. The action of the ſtomach is intimately connected with the demand that is made by the ſyſtem for a ſupply of nouriſhment. Exerciſe, by occaſioning

caſioning a waſte of fluids, increaſes the demand, and of conſequence the powers by which digeſtion is carried on, are exerted for the purpoſe of anſwering it; while, at the ſame time, the functions of every part are kept in order. The labouring claſſes of people are ſecured by their occupations from a loſs of tone in the ſtomach. If much exerciſe be employed, a conſiderable latitude may be allowed in regard to the quantity of food; but the ſedentary ought always to put ſome reſtraint upon their appetites. They cannot with impunity indulge them to their full extent.

The action of the ſtomach appears to be very much under the influence of the mind. Anxiety, grief, rage, and other violent

violent paſſions, have frequently the effect of cauſing an immediate ſuſpenſion of the digeſtive proceſs. Chearfulneſs and good humour contribute exceedingly to the preſervation of health; but the peeviſh and the melancholy are peculiarly liable to have diſorder in the alimentary canal. For the prevention and removal of the diſeaſes under conſideration, it will be of much importance to avoid weighty cares, and every thing that might agitate and diſturb. It is to be lamented, however, that an irritability of temper, and a gloomineſs of mind, are with difficulty got the better of. When much indulged, the endeavours at the reſtoration of the digeſtive powers will ſeldom prove ſucceſsful.

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When an improper fermentation has ariſen in the primæ viæ, it is apt to be communicated to other ſubſtances, mingling with the matter already in a fermenting ſtate. The continuance of it from this cauſe may be obviated by the occaſional uſe of emetics. Ipecacuanha, exhibited in doſes ſufficient for evacuating the offending matter, has frequently been of ſervice. Vomiting, if judiciouſly employed, may be rendered of conſiderable advantage.

A tendency to diſorder in the ſtomach is very often accompanied with an habitual coſtiveneſs; but at intervals the acid becomes a purgative, and occaſions looſeneſs with griping. The laſt of theſe ſtates is the leaſt prejudicial. It is much better

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that a part of it ſhould be carried off in this way, than that the whole ſhould be received into the circulation. For the removal of coſtiveneſs, recourſe muſt be had to aloes, ſulphur, ſena, or any other purgative that may appear better ſuited to the ſituation of the patient. A looſeneſs, when inconvenience ariſes from it, may be reſtrained by abſorbents, with rhubarb and mild reſtringents.

A variety of medicines have been employed for the purpoſe of increaſing the tone of the ſtomach. The ſubſtances moſt frequently recommended with this intention, are certain vegetables diſtinguiſhed by a bitter juice. Camomile, gentian, columbo-root, orange-peel, and many others, are of conſiderable efficacy.

By correcting a tendency to the formation of acid, they have often proved of ſervice in arthritic and nephritic affection. It is generally admitted, however, that ſuch medicines, although *occaſionally* uſeful, ought not to be perſevered in for any great length of time without intermiſſion. In ſome caſes very pernicious effects have appeared to proceed from a long-continued exhibition of them in large doſes, and diſeaſes more alarming than theſe againſt which they were levelled have been produced.

THE greateſt number of bitters act more or leſs as aſtringents upon the ſyſtem, and it is perhaps from this circumſtance in a great meaſure that the danger of uſing them for a conſtancy ariſes in particular habits

habits. In people of a melancholic temperament, the natural tendency to accumulation in the veſſels will be increaſed by aſtringents, and from this cauſe affections of the brain and of the viſcera may ſpring. The means by which ſecretion is promoted accord better with ſuch conſtitutions.

When it is wiſhed that the effects of bitters may be confined to the ſtomach, ſmall doſes are ſufficient, and theſe which have leaſt aſtringency ſhould be preferred. The infuſions in water, with the addition of a few grains of ginger or of cardamom ſeeds, may be employed; or a tea-ſpoonful or two of the ſpirituous tinctures may be taken at any time in a glaſs of water. An infuſion of Peruvian bark in cold water is

a very slight but agreeable bitter, and has sometimes been used with advantage.

In many cases, the decoctions, or infusions in boiling water, of guaiacum, sassafras, and other woods abounding with a resinous matter and essential oil, have proved excellent remedies; and having a tendency rather to increase the secretions, they are not liable to the same objections as the astringent medicines.

The mineral acids are frequently of service in giving tone to the stomach, but we would not recommend them for the prevention or cure of diseases proceeding from a redundancy of acid. Every good effect that can be expected from them, may

may be obtained by the uſe of remedies leſs precarious.

CHALYBEATES have been employed with advantage for increaſing the digeſtive powers. In the caſes to which they are adapted, they appear to be very efficacious, but from their aſtringency they are not equally ſuited to every habit.

MINERAL waters of different kinds are very often of ſervice in correcting indigeſtion. Theſe at Bath, at Cheltenham, at Harrowgate, and at many other places, have been much reſorted to with this intention, and great advantage has been experienced from the uſe of them. The relaxation from care, that commonly

takes place while they are employed, contributes, likewiſe, to the benefit received.

The formation of acid in the ſtomach may ſometimes be prevented, by the exhibition of ſomething that has a tendency to check the progreſs of fermentation. Of all the ſubſtances with which we are acquainted, there is not any one better ſuited to this purpoſe than camphor. It is ſo active in ſtopping the common fermentations, that the julep deriving its name from it, although a diluted ſolution of ſugar, in which the proportion of camphor is too minute to be detected by any other means than the taſte and ſmell which it communicates, will endure the heat

heat of ſummer even for a very conſiderable time without becoming acid. The influence of the bitter medicines in preventing acidity, may be owing in ſome meaſure to their antifermentative powers.

The remedies by which the action of the ſtomach may be promoted are numerous, and it will be adviſeable to change them occaſionally. If the uſe of them be judiciouſly combined with proper attention to diet, acidity from fermentation may, in general, be avoided. When, however, the tendency to diſorder is exceſſive, or has been of long ſtanding, there will ſometimes be a generation of acid in ſpite of every endeavour to prevent it. In ſuch caſes it becomes neceſſary

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to guard againſt the effects of the acid by deſtroying it; and we are to conſider of the means in the following ſection.

SECT.

SECT. IV.

On the Deſtruction of the Acid.

THE deſtruction of any acid that has been generated in the ſtomach, may be effected by employing a quantity of an alkali, or of an abſorbent earth, ſufficient for the ſaturation of it. The alkali, or earth, will enter into chemical union with the acid, ſo as to form compounds in which the characteriſtic properties of each element are loſt. When thus neutralized, its influence upon the fluids will be compleatly obviated.

Of alkalis there are only three with which chemiſts are as yet acquainted, and they have equally the property of deſtroying acidity. The volatile alkali may in ſome inſtances appear unfit, on account of its ſtimulating powers; but whenever any ſtimulus of the kind is wanted in the ſyſtem, it may be uſed with advantage. It is very well calculated for removing the faintneſs and ſqueamiſhneſs with which an imperfection in the digeſtive powers is frequently accompanied. Between the fixed alkalis, viz. the vegetable and the foſſile, there is not much difference either in taſte or in their effects; therefore they may be employed indiſcriminately.

THE pure alkalis, having a ſtrong diſpoſition to unite with the mucilaginous matter of animals and vegetables, are termed cauſtic; and they have been conſidered as too acrimonious for internal exhibition. On this account they have moſt frequently been uſed in combination with ærial acid, with which they form compounds commonly called *mild alkalis*. Theſe compounds have in many caſes produced very good effects, but there are objections to them which it is neceſſary to ſtate. It is not improbable that a part of the ærial acid that is detached when they have been encountered by any other acid in the alimentary canal, may find its way into the circulation. Until it has been aſcertained whether or not the ærial acid can be conveyed from the ſtomach

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or inteſtines, in ſuch quantity as to occaſion any conſiderable precipitation of the concreting acid, there will be prudence in avoiding it. But it is liable to an inconvenience independent of its acidity. Being a vapour, it ſometimes cauſes diſtenſion in the bowels, with all the unpleaſant ſymptoms of flatulency.

The cauſtic alkalis, when diſſolved in pure water merely, cannot be received into the ſtomach with ſafety, as they would unite with the coats even of that viſcus; but they have, in general, been previouſly combined with expreſſed oils. The acid in the primæ viæ will be corrected by means of ſaponaceous compounds, as the attraction of alkalis to acids is ſtronger than to oils. Care

ſhould

ſhould be taken to obtain ſoap in the greateſt degree of purity. Of the common ſoaps, theſe from Spain are to be preferred; but the *Sapo amygdalinus* of the diſpenſatory is better adapted for internal uſe.

Soaps prepared with expreſſed oils are not free from objections, for they very often diſagree with the ſtomach. In ſuch caſes, the acrimony of the cauſtic alkali may be corrected by diffuſing it through any mucilaginous fluid. It will unite with the mucilaginous matter into a ſpecies of ſoap ſufficiently mild without being offenſive. The *lexivium ſaponarium* may be added to a baſon of veal or mutton broth, at any time when there is occaſion for it; and if they be boiled together

gether for a minute or two, the combination will be rendered very compleat.

The earthy ſubſtances uſually employed for the correction of acidity in the ſtomach, are calcareous earth and magneſia. Like the alkalis, they are beſt ſuited to this purpoſe when free from ærial acid; therefore lime-water and calcined magneſia are to be preferred to chalk and common magneſia.

It has been apprehended, that a long continued uſe of alkalis or of lime, might produce a dangerous alteration in the ſtate of the fluids. When they are uſed in quantity, an alteration will undoubtedly take place; for if they be received into

into the circulation, there muſt be a decompoſition to a certain degree among the native ſalts of the body. The earth, which is kept in ſolution by acids, will be precipitated, and we can conceive that it may be depoſited in particular parts ſo as to produce concretions; or that the freedom of the circulation may be impeded by it. It does not appear, however, that any diſeaſe has been occaſioned by the uſe of alkalis. On the contrary, by correcting diſorder in the ſtomach, they have frequently had the very beſt effects upon the ſyſtem, and the vigour of the whole has been augmented by them. If the earth, when detached, ſhould be permitted to accumulate, it is probable that diſorder would ariſe from it. But the alkalis themſelves have ſo great a tendency to

cauſe

cauſe an increaſe of the various ſecretions, that they afford a ſecurity againſt any accumulation. The emunctories are, in general, ſo much relaxed by them, that the ſuperfluous earth is very ſoon diſcharged, and it appears in the urine as ſoon as it has been evacuated, in the form of a white powder.

THE doſes of alkalis and of earths muſt be in proportion to the degree of acidity, and it is much better to uſe them frequently during the day, than to give a great quantity at once. They may be employed before or after each meal, and the bitter infuſions, or any thing elſe, appearing better adapted to the ſtate of the ſtomach, may be occaſionally exhibited

bited along with them. If they be uſed with judgment, every particle of acid generated in the primæ viæ, and likewiſe any that has been received into the ſtomach, will be deprived of theſe properties by which acids are rendered prejudicial.

The Concluſion.

BY the means which have been recommended, the introduction of any acid from the ſtomach or inteſtines will be effectually guarded againſt, and as ſoon as the redundant acid already in the veſſels has been diſcharged, the fluids will return to their natural condition. The matter from which the petrefying quality of the urine in Gravel, and the interrupted ſtate of the circulation in Gout, appear to proceed, having been removed, theſe affections will be eradicated. They cannot ſubſiſt independent of the ſources from which they ſpring.

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THE uneaſineſs from the formation of the ſmall chryſtals that conſtitute Gravel will ſoon be at an end; and, knowing the nature of calculi, we are led to imagine, that by a due perſeverance, ſtones likewiſe will at laſt be got the better of. The urine, not now containing any preternatural redundancy of acid, will itſelf become a menſtruum for the calculus. The ſolution indeed will be very gradual, as the proportion of concreting acid that water in the heat of the body can unite with, is extremely minute: but if it looſes a grain or two a-day, it muſt continue to diminiſh until the whole is carried off. In this manner it is probable that a concretion may in time be removed by the urine, without any other aſſiſtance; but if that fluid can be impregnated with al-

kali, or with lime, the ſolution will be accelerated.

When urinary concretions were conſidered as calcareous earth, of which the particles were cemented together by mucus, it has been ſuppoſed that cauſtic alkalis might unite with the mucus, leaving the earth to fall to pieces. Many, however, have been of opinion, that an alkali exhibited by the mouth, could not arrive at the kidnies in a ſtate to act upon a calculus, for that, before it can be ſecreted with the urine, it muſt have ſaturated itſelf with mucilaginous matter, ſo as to be incapable of diſſolving any part of the cementing mucus of the ſtone. From this kind of reaſoning they were ſo much ſatisfied as to the inefficacy of ſolvents,

vents, that they have ſeldom thought it worth while to make any trial of them; and the caſes in which they were ſaid to have ſucceeded, have very often been diſregarded as fictitious.

It muſt be admitted, that the cauſtic alkali, before it can come to be contained in the urine, will have taken up from the inteſtinal canal, and from the blood veſſels, nearly as much mucilaginous matter as it is capable of combining with; but it being now certain that calculi are a peculiar acid, the queſtion of their ſolubility will turn upon the comparative attractions of alkalis to that acid, and to oily or mucilaginous ſubſtances. The compound of an alkali with any matter to which it has not ſo ſtrong an attraction as

to concreting acid, will form a menſtruum, by which, if conveyed to the urinary paſſages, a ſtone in the bladder will be diſſolved.

With a view of aſcertaining the degrees of attraction to alkalis between expreſſed oils and concreting acid, I made the following experiment. A ſolution of ſoap was prepared by boiling twenty grains of the *Sapo Amygdalinus* in two ounces of roſe-water, and as ſoon as it had been removed from the fire, five grains of the chryſtals of pure concreting acid were added to it. Upon agitating the vial, I obſerved that there was an evident decompoſition of the ſoap, for the fluid, which till then had been nearly tranſparent, became in appearance like cream. The pre-

precipitation of the oil was not ſo compleat as it would have been if any of the common acids had been employed, for it neither aroſe to the ſurface, or ſubſided to the bottom. The mixture, in which the ingredients remained blended together, had a ſtrong reſemblance to the milky compounds produced by agitating expreſſed oil with a ſolution of ſoap, or of an alkali impregnated with ærial acid. The alteration, however, was ſufficient to point out ſome chemical change, and in a ſhort time the concreting acid was entirely diſſolved. If the urine, therefore, can be rendered a ſaponaceous fluid, it will become a menſtruum for a calculus.

When an alkali, either by itſelf or in conjunction with any other matter to which it has not ſo ſtrong an attraction as to the native acids of the body, has been received into the fluids, the firſt effect from it is a decompoſition of the earthy ſalts, as mentioned in the laſt ſection. A portion of it will be expended in uniting with the acids from which the earths have been detached, but if the quantity exhibited be more than ſufficient for the ſaturation of theſe, the other part will remain unaltered, and it may be ſecreted by the kidnies. Thus, from theory, we might conclude, that the urine may be impregnated with ſubſtances of this kind; but when the effects of any particular matter upon the body are to be aſcertained, experiment alone can afford entire

entire ſatisfaction. It is the only ſpecies of proof with which the mind can feel contented. Let us, therefore, attend to the effects that are actually produced by alkalis or ſoaps.

It appears, from the obſervations of many authors, that during a courſe of theſe medicines, the urine, as it paſſes from the bladder, has been found to contain a white powder, of which great quantities have ſometimes been collected. This powder has uſually been conſidered as part of a concretion, or as Gravel that had been lodged in the paſſages until brought away by the alkali. It is, however, very different in properties from the concreting acid, and agrees in every reſpect with the earth that may be precipitated

tated from the urine, by adding an alkali to it when diſcharged. Here, then, is indiſputable evidence of the influence of alkalis being extended to the urine.

The quantity of alkali requiſite for producing this appearance is not very conſiderable. I have obſerved, that half a drachm of ſalt of wormwood exhibited in a glaſs of water every two hours, until two or three drachms have been employed, will cauſe an alteration in the urine. In ſome caſes, the whole of the earth appeared to be precipitated; and, beſides, there was a redundancy of alkali ſufficient for giving a green colour to the ſyrup of violets. Upon mixing a few drops of muriatic acid with urine in this ſtate, the earth was diſſolved, and the whole became

came tranſparent; but upon adding a little more, it was again rendered turbid by the precipitation of the concreting acid. The ſediment now was the real matter of calculi, the ſubſtance of which Gravel * and urinary concretions are compoſed.

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* In the courſe of this treatiſe we have always conſidered gravel as conſiſting of concreting acid. The earth, however, precipitated from the urine in the bladder by alkalis, may be looked upon as a ſpecies of Gravel; and it is probable that there may ſometimes be, from other cauſes, a redundancy of ſuch earth; but not having any diſpoſition to chryſtallize, it would be leſs pernicious in its tendency, than a preternatural redundancy of acid. I lately met with a man who frequently diſcharged with his urine, a powdry ſubſtance of a whitiſh colour, and readily ſoluble in acids. It appeared to be either animal or calcareous earth; for, upon adding a ſmall quantity of acid of ſugar to the ſolution of it in any other acid, the compound which has been called ſaccharated lime, was precipitated.

The urine, in this laſt caſe, was impregnated with mild alkali; but it would not have had much effect upon a calculus, the attraction of the alkali to the ærial acid already united with it being greater than to concreting acid. When a ſtone is to be diſſolved, the cauſtic alkali muſt be employed in combination with oily or mucilaginous ſubſtances. Large doſes of the ſoap lees diluted with mucilaginous fluids may be frequently repeated; or pure ſoap may be conjoined with a ſolution of lime in the manner formerly recommended by Dr. White. Lime-water requires to be drank in great quantity when it is intended to produce any conſiderable effect, as the proportion of lime contained in it does not amount to more than a few grains in a pint. It

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may be uſed in the room of every other fluid at meal times, and if it be impregnated with any thing aromatic in the manner of the compound lime-waters, it will be rendered an agreeable ſubſtitute, conducive to the proper action of the ſtomach, and admirably adapted to all in whom there is any tendency to acidity.

THERE are caſes well authenticated, in which ſtones have been removed by the uſe of alkalis and lime. In others, where they have appeared to fail, it is probable they were exhibited in an improper manner, and without ſufficient care to avoid any circumſtances by which their effects would be counteracted. It is to be lamented that medicines of this kind have been neglected by the regular practitioners.

ers, becauſe their miſtaken ideas of calculi led them to diſtruſt the power of ſolvents. The employment of them has reſted with empirics, who were ſo very ignorant of every principle upon which they ought to be adminiſtered, that ſour rheniſh and other acids, have ſometimes been joined with the alkaline lixivia. It is not ſurpriſing that valuable remedies, when thus abuſed, ſhould have fallen into diſrepute.

A calculus may ſometimes be precluded, by its ſituation in the body, from being acted upon by ſolvents. A ſtone in the ſubſtance of the kidnies, or in a bag formed by the protruſion of the inner coat of the bladder, would be, in a great meaſure, defended from any menſtruum. But when

when no ſuch impediments are in the way, their operation, being chemical, may be conſidered as more certain than that of medicines in general. The utmoſt attention, however, to every method of preventing a redundancy of acid will be neceſſary. If ſo great an object as the ſolution of a ſtone be held in view, acids, aceſcent vegetables, and every kind of fermented liquor muſt be abſtained from with the greateſt ſtrictneſs. At the ſame time, as much exerciſe as the patient's ſituation will admit of ſhould be employed. By cauſing an agitation in the urine, it will tend to promote the ſolution; whereas, if the whole be at reſt, the part in contact with the ſurface of the ſtone will ſoon be ſaturated, and the remainder kept at a diſtance.

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Conſiderable relief is frequently obtained long before the ſolution is compleated; for when the medicines have began to take effect, the ſurface of the concretion becomes ſofter, and leſs liable to irritate. Patients have frequently been induced, by this temporary abatement of the ſymptoms, to deſiſt from the uſe of them, and of conſequence they have, in a ſhort time, felt as much uneaſineſs as at firſt. The affections that ſpring from calculi in the urinary paſſages are ſo very alarming, on account of the pain which they occaſion, and of the danger with which they are attended, that the greateſt inconveniences ought to be endured for the proſpect of being relieved from them. The remedies ſhould be continued with ſteadineſs, until the whole be removed;

removed; and the ſooner that intention has been anſwered the better, for ſtones, by remaining in the body, very often produce in the ſurrounding parts, alterations which can never be recovered.

When we are aiming merely at the correction of a redundancy of acid, from which Gravel or Gout are apprehended, the alkalis and lime do not require to be employed in ſo great quantities as for the ſolution of a ſtone. They need only be given in ſufficient proportion for the regular correction of any acidity in the canal. Our view, in this caſe, is to prevent the future introduction of any foreign acid, and for this purpoſe, nothing can be better adapted than magneſia. It may be uſed for the deſtruction of acids in

the primæ viæ, with as much advantage as alkalis themſelves, and it is free from every objection. Excepting, therefore, when there is a calculus to be diſſolved, we would give it the preference for general uſe. The alteration occaſioned in the fluids by alkalis, although it does not appear that any diſorder has ever ariſen from it, is ſuch as no man would chooſe to produce without neceſſity. Small doſes of from ten to twenty grains of magneſia, may be exhibited three or four times a-day, ſo that it may always be in readineſs to unite with any acid. At the ſame time, a few glaſſes of wine after dinner may be allowed. The ſtrong wines were mentioned as the moſt proper, becauſe they uſually contain leaſt acid. If they were to be diluted at the time of uſing them,

them, with about a third part of lime-water, they would be rendered more ſafe, without being impaired in taſte.

For correcting the diſpoſition to a contracted ſtate of the ſecretory veſſels, ſo extremely conducive to an accumulation of the redundant acid, antimonials, and other medicines, exhibited in ſuch a manner as to produce relaxation on the ſurface, have frequently been of ſervice in gouty habits. The application to the body of water in the form of vapour, and the warm Bath, have likewiſe been uſed with very good effect: but a regular habit of keeping the moving powers in proper action, is of the greateſt efficacy. We have had occaſion to ſpeak of the advantages reſulting from exerciſe, on various

accounts. Thoſe who would wiſh to be ſecured from Gravel and Gout, muſt avoid a life of indolence.

It has repeatedly been obſerved, that the introduction of acids from the inteſtinal canal, appears to be the moſt frequent ſource of a preternatural redundancy of concreting acid. If, however, a redundancy from any other cauſe, be ever ſufficient for producing Gravel or Gout, the means of prevention and cure muſt be nearly the ſame. Alkaline medicines, and the circumſtances by which accumulation is guarded againſt, would prove effectual remedies.

When calculi have been formed on the joints, they are out of the courſe of the fluids;

fluids; therefore, medicines cannot be expected to take much effect upon them. If the growth, however, be entirely put a ſtop to, it is probable that a gradual diminution of them will take place from abſorption.

Of the regulations that have been laid down, all are not equally adapted to every conſtitution: the application, therefore, to particular caſes, muſt be made under the direction of any medical adviſer to whoſe care a patient has been uſed to ſubmit himſelf. To give tone to the ſtomach is one of the leading intentions in almoſt every thing that has been preſcribed. When the tendency to diſorder is conſtitutional, it cannot be eradicated, and in ſuch caſes, the regulations muſt be

be perſevered in during life. But when the health has been re-eſtabliſhed, it may afterwards be ſecured by means of regimen, without much aſſiſtance from medicine.

In habits very much debilitated from exceſſive irregularity, or other cauſes, there will be much difficulty in effecting a reſtoration of the digeſtive powers. If flatulency, nauſea, pain in the forehead, and other ſymptoms of indigeſtion be occaſionally perceived, it may be concluded that the proper action of the ſtomach is yet deficient. For ſucceeding in ſuch caſes, an unwearied attention to the various regulations will be requiſite; but very little advantage will be obtained from a partial adherence to them. It will be

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in vain to aim at the prevention of diſorder in the primæ viæ, if an unlimited indulgence be given to a luxurious appetite.

ALTHOUGH no part of the ſyſtem can be attended with much inconvenience, very few will have reſolution to perſevere in it with an exactneſs that ſhall entitle them to ſucceſs. From obſtinacy in ſome, and a want of determination in others, the rules for the prevention and cure of diſeaſes, are uſually complied with but in part only; and reproach is often thrown upon the means, when the blame ought to reſt entirely with the individual, for having miſapplied them.

By purſuing the plan recommended, not only the diſeaſes againſt which it is peculiarly levelled may be kept at a diſtance, but a multitude of others proceeding from diſorder in the digeſtive faculties will be mitigated or cured. Strength of body and ſound health will ſucceed to infirmity and pain.

FINIS.